Topic 1

“WMSDs Work related Musculo-Skeletal Disorders”

Vegetable grafting in greenhouses: the risk of musculoskeletal disorders for workers due to repetitive movements of upper limbs

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Keywords: OCRA index, work hygiene, WMSDs

Aim

The herbaceous grafting in horticulture is a practice widely spread and it permits to unite the quality and productivity characteristics with those of resistance to pathology transmitted from the soil, much more quickly as regards the time necessary for genetic improvement. There are different methods of grafting (crown, cleft, etc.), especially used by skilled workers with the help of manual tools such as the grafting knife. Grafting work requires an effort of upper limbs, owing to the great number of repetitive movements and the precision required to cut the grafting sections. All this determines a risk for workers who operate about six hours a day in these conditions. The risk may involve some pathologies, generally of different origin (such as wrist and shoulder tendinitis, lateral epicondylitis, carpal tunnel etc.), defined work related musculo-skeletal disorders (WMSDs). Aim of this research is to assess the risk of musculo-skeletal disorders due to repetitive work, for workers employed in manual grafting.

Methodology

To assess the risk we used the "OCRA index" method, according to ISO 11228-3:2009 (Ergonomics - Manual handling - Part 3: Handling of low loads at high frequency) which keeps into account several factors (repetitiveness, prehension force, posture, etc.).

Results

Results show a medium-high risk for the right limb which carries the cut on the small vegetables and a medium risk for the left limb. The factors which contribute to reach such results are mainly the continuous pinch of the knife, the great number of movements and the lack of recovering time.

Conclusion and perspectives

It does not seem possible to eliminate the risk in this job, but at least it could be reduced. Increasing the number of workers would not make a great difference; by doing so, more people would be exposed to risks of WMSDs.
At present a possible measure to reduce the risk consists in a reorganization of work, including breaks during the early stages of the shift. In this way it is possible to reduce musculoskeletal discomfort and fatigue for workers during the day, with little impact on production.

Exposure to risk of musculoskeletal injury and over exertion during cattle handling cattle in open areas

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Keywords: animal handling, livestock safety, working environment

Aim

Working with beef and dairy cattle in open areas exposes workers to a high risk of musculoskeletal injuries and/or over exertion. Cattle that are not contained, as with beef raised on pasture, are unpredictable in their behavior and have the capacity to act in aggressive ways if approached or sense that their territory ore their young are being threatened. These defensive behaviors can lead to being butted, gored, kicked or mauled due to the superior strength, size and quickness of the animal. In addition, injuries can occur when cattle are being moved due to slips and falls on rough or slippery surfaces. The aim of this presentation will be to review the data on injuries to workers when working with beef cattle in open areas, and summarize critical livestock handling practices that would enhance worker safety.

Methods

Findings are based on work carried out as field studies on six Swedish farms during the pasture season, where the risk factors in connection with farmers' work with cattle in open pastures were studied. Data will be supplemented from comparable observations made on six small beef operations in the U.S. Duration and sequence for the identified tasks have been observed and registered during the farmer's driving, transporting and relocating cattle in pastures and free-range situations. The risks of injuries are assessed for the current tasks using Working Environment Screening Tool in Agriculture (WEST-agriculture).

Expected Results

The results from the findings of this study will be used in the development of educational resources that target small beef producers who raise cattle in open areas or on pasture. It is anticipated that adoption of the recommended practices will reduce the risk of injury. Specific questions that should be answered include:

- Which cattle handling activities in open areas cause the greatest level of risk of injury and over exertion to the farmer, i.e. gathering, transporting.
- What practices can be implemented that will reduce the farmer's exposure to the aggressive behaviour of the cattle and other related hazards.
- What low cost animal handling technology could be incorporated that would enhance the safety of the farmer and the welfare of the cattle.

Work-related musculo-skeletal disorders in farm workers of eastern Sicily

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Keywords: repetitive movements of the upper limbs; manual handling of loads; agriculture

Objectives

Sicily is home to 14% of Italian commercial farms. Their workforce is predominantly comprised of the farmers and their families (>75%). All such tasks involve a degree of exposure to safety and health risks. Over the last 5 years, 5% of all occupational accidents in Italy have occurred in Sicily; 13% were fatal. Occupational diseases, which affect <2% of farm labourers, are predominantly noise-induced hearing impairment and respiratory conditions (nearly 80%); osteoarticular conditions affect <10% of farm labourers.

Methods

The study involved 370 labourers from 13 commercial farms in eastern Sicily. Each participant underwent a number of clinical and instrumental tests and examinations and was asked to fill in a questionnaire inquiring about job type, tasks and their mode of execution, and osteoarticular conditions, especially those affecting the spine and the upper limb girdles. The OCRA and NIOSH index were applied to assess the risk of exposure to repetitive movements of the upper limbs (RMUL) and the risk related to manual handling of loads (MHL).

Results

The mean age of the subjects involved in the study was 43.4 years (±7.6) and their mean job seniority was 21.6 years (±6.3). Seven farms produced vegetables and six produced fruit and citrus fruit.
The RMUL and MHL exposure assessment demonstrated a high degree of risk exposure for all labourers in relation to the tasks involved by the tending of different products. The risk was especially high to develop low-back pain and other musculoskeletal conditions.
The present findings suggest the need for training farm workers and for adapting and renovating the work equipment to reduce the number of occupational injuries; in particular all those surveyed were found to be exposed to MHL, biomechanical overload and incongruous postures. The fact that most tasks are performed in environments, like fields and conservatories, where the microclimate cannot be controlled compounds the problem.

Analysis of stress produced during manual pruning in Vineyard: the study of anthropometric parameters

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Keywords: security, shears, upper limb

Objectives

The operations during manual pruning in vineyards need repente and rapid movements and for this reason are the subject of studies to evaluate possible influences on musculoskeletal upper limb impairment. Numerous studies have focused on the methodologies of the interactions between cognitive actions, efforts and osteoarticular diseases and have been developed various methods for the quantification of risk and the weight of each action. One method is to compile a check list which expresses a degree of risk through the weighting of individual gestures making up the overall operation and the force estimated by the operator. In recent years there has been a line of research aimed at developing tools that can provide measurements of the effort, with the aim of replacing subjective evaluations from a panel of professionals interviewed during the action. The provision of a kit consisting of a shear equipped with sensors made it possible to map the efforts made by hand in order to evaluate both the overall effort to that produced by single muscle compartments. With the present work intends to investigate the interactions between some anthropometric factors and shears between them different.

Methods

Experimental tests were conducted in the laboratory on branches from vineyards during winter pruning on a group of 10 healthy volunteers subjected to tests using cutting shears types on the market, mainly different for characteristics of the handle and blade. Were recorded for each individual: age, weight, height, length, width and thickness of the hand volume, length, width, volume and thickness of the arm and forearm. During the cutting operation has been detected effort of the hand in terms of intensity and duration by a shear equipped with sensors.

Expected Results

The aim of this paper is to establish a relationship between anthropometric parameters and stress as a function of the hand grip of the different types of cutting tool.

The sunrise of agricultural ergonomic and safety studies in Italy and in Europe

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Keywords: agricultural, safety, history

Objectives

Far away to be a complete work of all the first agricultural ergonomic and safety studies in the sixties-seventies, aim of this paper is to focalize the occupational hazard problems that the researches faced at the beginning of the agricultural mechanization spread in Italy and in Europe to let a comparison with today's situation.

Methods

European literature, standard and Italian laws of the period around 1955-1975 have been first collected and examined. Different historical periods have been afterward considered, rather than to describe specific occupational hazards, because the focus of the paper is to highlight safety and ergonomic operator risks in function of the mechanization level and machines spread in the different agricultural and forestry fields.

Expected Results

It is obvious that during the time the technology and the mechanization level have mainly displaced the axis hazards from mechanical and electrical risks only to others (as physical and chemical). Among all the machines, the tractor was and is the main responsible of all the injuries type.
Unfortunately, in Italy a common risk was present at the beginning of the spread agricultural mechanization among the farms as well as nowadays: the machine overturn (66% of fatal injuries in 1957 and around 90% in 2009).
The tractor overturning risk is one of the most dangerous and it may be caused by many environmental factors, such as soil slope and soil sinking (which do not change in the time) but also by human factors as wrong operating machines connection, unbalanced charge, high speeds, especially in turns and over slopes soils. The previous circumstances become worst if the tractor is not in a good maintenance condition or if 'personal' changes are made to the machine, such as mass distribution modification or protective equipment elimination (because: ' ... they slow the working activities'). This occurrence happens today as 50 years ago did.

Evaluation risks of biomechanical overload during the manual vineyard pruning by using measured values of the effort

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Keywords: OCRA Method, EMG, MCV

Objectives

Several analytical methods have been developed to determine and quantify the risk from exposure to biomechanical overload of the upper limbs. The subjective estimates of the force applied by the workers during the assessment of muscle-skeletal risk exposure in the vineyard manual pruning appear critical. Some recent research has been carried out using a sensorized scissor to obtain measures of the handling effort used, in place of the estimates expressed by the workers (Schillaci et al., 2010; Romano et al., 2010). This research proposes a preliminary study of an experimental methodology in order to replace subjective opinions with instrumental values obtained by using electromyography (EMG) in assessing the risk of muscle-skeletal overloading of the upper limbs during manual vineyard pruning.

Methods

The OCRA method (Colombini and Occhipinti, 1996, 2005) is the procedure recommended by the international standard (ISO 11228-3) for risk assessment from overload due to upper limbs repetitive movements. The Borg CR10 scale is usually used to evaluate the subjective perception of the strain in relation to the amount of the strain. In this research, we have used the results of laboratory tests that used EMG performed by a sample of pruners on different vine cultivators with different branch diameters and with different scissors. Using the surface EMG it was possible to highlight the actions taken by each muscles involved in the technical actions. The measurements of the EMG acquired were compared with the measurements of the MVC (maximum voluntary contraction) on the activity and the subject examined.

Results

From the data processing recorded during the laboratory operations, represented by percentage of intensity compared to the relative MCV, a value was obtained for the strength for each muscle analyzed during the activity and for an intensity scale of the strength. The values of the "strength" acquired have been used to calculate the risk through the OCRA index. The results obtained were compared with the workers opinions about the subjective perception of the strain and with the results of previous research (Schillaci et al., 2010; Romano et al., 2010). The EMG tests have shown the involvement of the muscular districts involved giving new ideas about the risk assessment in pruning operations.

First evaluation of the risk from repetitive movements in greenhouse nurseries: annual cycle and multitask analysis

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Keywords: checklist OCRA, database, work organization

Objectives

The aim of this study is to develop an appropriate methodology in the field of musculoskeletal risk in horticultural greenhouse nurseries in eastern Sicily.
During the ordinary activities in the nursery the tasks have been identified and for each task was evaluated exposure to risk through the OCRA Checklist.
This study represents the starting point of a national work group made up of doctors and experts in the field of work place organization, whose aim is to put together simplified methods (database, software) that permit the monitoring and management of the risk of biomechanical overloading in such complex situations as cultivation in protected environments.

Methods

Measurements were carried out in different nurseries located in eastern Sicily.
The first part of the work consisted of the identification of the main sectors and tasks characterising the activities in the (plant) nursery.
The measurements were conducted using the technique of breaking the work into its elementary phases. The tasks were later filmed.
Subsequently, the use of the OCRA checklist made it possible to assess the postural requirement (shoulder, elbow, wrist, hand) for each task and to quantify the biomechanical overloading of the upper limbs.

Results

There are several activities in the nurseries where there is a risk of biomechanical overload due to repetitive movements of upper limbs and the manual movement of loads.
In nurseries also, seasonal work influences the risk and the exposure of workers to biomechanical overloading depending on the task carried out and varies also for the same task according to the intensity and duration.
The observations confirmed that nursery activities show a considerable risk and should be considered throughout the annual cycle.

Literature review: application of the OCRA method in agriculture and agro food activities

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Keywords: repetitive movements, checklist, evaluation of risks

Objectives

The aim of this paper is to implement revisions of the application of the OCRA method in the Italian agriculture and agro-food sectors available in the literature. In Italy risk assessment for biomechanical overload of the upper limbs due to repetitive movements, is performed using the OCRA method (OCcupational Repetitive Actions, Colombini and Occhipinti, 1996, 2005).
The OCRA method has been reported and used in a number of consensus documents and National and International guidelines. Nowadays it is used as a method of assessing risk caused by repetitive movements of the upper limbs and is recommended by the technical standards ISO 11228-3 (Ergonomics - Manual handling - Part 3: Handling of low loads at high frequency) and EN 1005-5 (Safety of machinery - Human physical performance - Risk assessment for repetitive handling at high frequency).

Methods

The OCRA method is based on two procedures: the OCRA Checklist, which is used for a preliminary estimation of operator exposure, and the OCRA index, which is used for a more detailed assessment of risk. The latter procedure offers significant standards for the preventive and redesigning measures of the work processes that follow. In Italy, in reference to the activities of the agriculture and agro-food sector, the OCRA index has been applied only recently in viticulture, peach growing, olive cultivation, cheese and mozzarella production, tomato harvesting and sorting, crop spraying in greenhouses and in the floral and nursery sectors.

Results

From the review of the articles it appears that the spread of the OCRA method in the agricultural sector has been hampered by the difficulties of applying the method in a context that is very different from the industrial and manufacturing sectors.
Furthermore, it should be noted that this method has its complexity and for its application it requires a lot of time and adequate training of the evaluator.
The surveys carried out show the necessity to undertake a suitable study of organization in agricultural workplaces and to adapt to some specific aspects that the method shows in the agricultural compared to other sectors.

Risk evaluation of upper extremity musculoskeletal disorders among cheese processing workers: A comparison of exposure assessment techniques

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Keywords: biomechanical exposure; exposure assessment; musculoskeletal disorders

Objectives

Musculoskeletal disorders affecting back, neck and upper limbs are one of the most relevant occupational diseases in the European Union and North America. The large incidence of these disorders has had a significant economic impact on social costs in all countries. The risk of developing musculoskeletal disorders appears to be quite high in food industries where many tasks require high physical exertion, repetitive motions and awkward postures. In cheese processing, additional factors such as microclimates, environmental conditions and manual materials handling pose additional stress. The purpose of this study was to evaluate the risk of developing upper extremity disorders among workers employed in sheep cheese production. A secondary purpose was to evaluate the agreement between two commonly used exposure assessment techniques in the risk evaluation.

Methods

Workload on upper extremities was examined in cheese processing tasks performed in the production, curing and packing departments. Work tasks were video recorded from two perspectives (grossly sagittal and frontal planes to the worker) and analyzed for five complete task cycles to quantify the main ergonomic risk factors (duration, frequency, posture, and force). Risk evaluation was estimated for 20 work tasks with the OCRA and Strain Index methods.

Results

The results lead to identification of the most problematic work tasks, the critical factors contributing to risk within the tasks, and the usefulness of each assessment technique.
The most problematic work tasks were identified in the packing and production departments, while the curing operations, which automation level has been recently improved, shown the lowest risks. The two risk evaluation methods provided similar results in situations with low and high risk, especially for tasks involving hand and wrist intensive movements.

A clinical test to research objective values of effort during manual pruning

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Keywords: biomechanical overload, EMG, OCRA

Objectives

The current rating for the determination of risk from biomechanical overload of the upper limbs during pruning operations with traditional shears, refers to quantifications methodologies which are based on estimates of subjective operators interviewed during operations. The OCRA method (Colombini and Occhipinti, 1996, 2005) is the procedure recommended by the international standards EN 1005-5 and ISO 11228-3 for the risk assessment overload due to repetitive movements of upper limbs.

Methods

This research was based on laboratory pruning tests monitored through a surface electromyograph (Fig 1). The pruning operations were performed by a sample of seven healthy operators who performed the cutting, always in the same position, on shoots collected by vineyards during the winter pruning. The branches were collected from four different cultivars of vineyards and were divided into groups of two diameters (<5 mm and 8-12mm). The electromyograph was monitored by medical personnel and acquisitions were saved for subsequent processing. The muscle activity was detected by EMG via surface electrodes placed on the skin of forearm muscle. In this case, the isometric situation is not too complex, and the number of muscles involved is small, especially as the biceps and brachioradialis muscles are involved in a synergistic way.

Expected Results

The processing of data collected during the operations conducted in the laboratory, allowed to observe the ability of the clinical test to read and interpret the effort made by the muscles of the arm of the pruner. The correlation between the peak values of muscular effort and the diameters of the branches was analyzed in order to have a dimensional confirmation. It was also developed an analysis of variance in order to statistically show significant influences of the factors considered during the test, on the results of muscular effort pointed out from medical records. These results have highlighted the involvement of affected muscle groups, providing new insights into the risk assessment of pruning.

Topic 2

“Machine Milking, Animal Welfare, Work Organisation”

Effect of different vacuum levels on buffalo milking

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Keywords: animal welfare, milking, Mediterranean Italian buffalo

Objectives

The aim of this study was to determine the effects of three different working vacuum levels (40, 46 and 52 kPa) on the milk production, milk flow rate and milking times in Mediterranean Italian buffalo.

Methods

A total of four hundred and four milk flow curves were recorded at random from all of the four hundred and fifty animals in different parity and stage of lactation over a period of 12 weeks, with electronic milk flow meters (Lactocorder®).

Expected Results

The different vacuum levels tested did not affect significantly both the individual milk production per milking (on average 4.00±0.06 kg) and lag time before milk ejection. When diminishing vacuum level, a decrease in average and peak flow rate occurred ($P<0.001$), as well as an increase in effective milking time between attaching the teat cup and reaching the value of 0.20 kg/min at the end of milking ($P<0.001$).

Ergonomic exposure assessment of posture and muscle activity among dairy parlor workers in US large herd operations

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Keywords: dairy, agriculture, electromyography, posture

Objectives

The US dairy industry has experienced a relatively rapid transformation from small herd farms to large-herd, mass production operations. During the last 30 years the number of US dairies decreased while herd sizes and milk production increased. This transformation has led to significant changes in work tasks and in ergonomic challenges due to the highly repetitive work nature of the milking process. Minimal research has addressed ergonomic issues in these mass-production environments. Field-based direct measures of physical exposures have been limited in these challenging work environments. The purpose of this study was to evaluate the usefulness of full-shift quantitative exposure assessment tools for assessing posture and muscle activity among large herd parlor workers.

Methods

Study participants were recruited from large herd dairy operations in the states of Colorado, New Mexico and Texas. Each participant was Hispanic, worked full-time in a dairy parlor, and was free from pain or pathology in the upper extremity. Shoulder elevation and trunk inclination angles were estimated using triaxial accelerometers. Accelerometers were wireless, battery powered, and packaged in a small pager□sized portable casing with 2 megabytes of built in datalogging memory. Surface electromyography (EMG) was sampled continuously during an entire work shift while workers performed milking tasks. EMG samples were composed of continuous recordings of the upper trapzezius, finger flexors, finger extensors and anterior deltoid (shoulder flexor). These muscles were chosen for their relevance when performing milking tasks as well as the ability of researchers to position surface electrodes over muscle bellies.

Results

Results suggest parlor workers are exposed to extreme exposures (awkward postures, high movement velocities, high repetition, high muscle forces, and inadequate rest). These physical exposures are often associated with the development of upper limb pathology. These findings warrant the need for continued research to investigate these working environments to facilitate the development of cost-effective intervention strategies. Several ergonomic strategies to reduce the physical exposures have been developed and are currently being evaluated for effectiveness.

Bull-Related Attacks – An Owner's Potential Liability

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Keywords: bulls, livestock injuries, agriculture, bull attacks

Objectives:

The hazards associated with breeding livestock, including bulls, have been well documented in the agricultural safety literature (Sheldon, 2009) and earliest annals of literature, including codes and regulations related to animal ownership. To date the database of bull-related attacks at Purdue University has documented over 300 cases of which approximately half were fatal. Due to the lack of a comprehensive surveillance system for agricultural injuries, the numbers of these events is probably much higher especially with respect to non-fatal incidents that go largely unreported. The goal of this effort was to review the legal questions related to bull attacks and to explore owner responsibilities in light of past legal precedents. Specific objectives included:

1. Review of the literature on past bull-related incidents resulting in litigation.
2. Explore specific bull owner liability issues with respect to appropriate restraint and containment of bulls to prevent personal injury or property damage.
3. Develop recommendations for bull owners that would reduce the risk of bull attacks and owner liability in the event of bull-related damages.

Methods:

Bull-related injury data was updated and summarized based upon work published in 2009 by (Sheldon, et.al.). Over 300 cases documented in the U.S. between 1980-2012 were reviewed for reports of civil litigation.

A search was conducted of current laws and regulations related to bull ownership and requirements for ensuring worker and public safety.

Results:

Bull attacks continue to be a serious issue for dairy and beef producers in both the U.S. and elsewhere. There is a long history of laws and regulations that have recognized the risks associated with bulls and the responsibilities of owners to protect others from bull-related injuries. Of the 300 bull attacks documented approximately half were fatal. Since most involved the owner or family member few resulted in civil litigation.

Key findings from the review of prior civil litigation included issues related to the owner's prior knowledge of unsafe bull behavior, failure to warn, and inadequate restraint or containment of bulls. In several cases where the bull had shown no prior aggression towards humans, the findings of the court generally favored the bull owner rather than the injured party.

Recommendations considered most significant included the need to assess how essential is the ownership of breeding bulls versus utilization of artificial insemination practices; enhanced awareness of the unpredictable and aggressive nature of breeding bulls; and the need for enhanced restraint and containment facilities, especially when bulls are maintained in open pastures and feedlots.

Changes in the US dairy industry require development of comprehensive employee training and safety programs

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Keywords: dairy, safety, training program

Since WWII the US dairy industry has changed to more efficiently produce dairy products to meet higher domestic and international demands. In 1944 the US dairy Industry produced 53 billion kg of milk with 25.6 million cows while in 2007 37% more milk was produced with 64% fewer cows. The number of dairy farms has declined while herd sizes continue to increase. Because of shrinking margins and consequential advantages of economies of scale, it is not an entirely unlikely scenario to see a new US model where economic equilibrium is reached with 9 million dairy cows consisting of 900 dairies with 10,000 cows each; as opposed to 9,000 dairies with 1,000 cows each.
As the number of large-herd operations continues to rise these dairies will continue to employ more workers. Currently it is common on dairies in the Western US to see one employee per 80-100 milking cows. Having larger numbers of employed workers presents new challenges for dairy owners and managers of ensuring safe working environments and complying with state or federal occupational safety and health regulations. Many dairy owners and managers are now responsible for managing human resources and safety programs, yet most have not had formal training in employee management or occupational safety.
The increased size of many of the southwestern dairies actually presents a unique opportunity for the development of tailored training programs since daily duties and tasks on the dairy have become highly specific and specialized. Historically, the task of training and supervision of employees typically was that of upper-management. With increasing employee numbers, this task is often delegated to employees with seniority (mid-level management). Formal training, including basic and theoretical study explaining the rational or the science behind particular work related activities, is not common. Often employees will know "what" to do but may lack the understanding "why". Super-imposed on this, the large majority of workers on dairies in the US are from different geographical and cultural origins; it is therefore imperative and appropriate that any training and safety program be based on understanding of linguistic and cultural barriers and attitudes towards working with animals and/or equipment.
It is imperative that insufficient understanding of the task can impact the outcome of the task in many ways: job motivation and hence job performance, thoroughness, expedience, accuracy, and finally but not any less important job safety. The organizational support to implement a successful training program has to be developed, and operational and managerial commitment to such a program is required.

A new testing technique for measuring the skid resistance of hard and soft flooring materials in dairy housing

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Keywords: dairy cows, floors, skid resistance

Objectives

The floors slipperiness is one of the main factors of hoof and leg injuries in dairy cow housing. The friction coefficients, static and dynamic, are the parameters commonly used for a specific evaluation. But the testing techniques commonly in use appear not very suitable since not capable of reproducing the real interaction between the animal foot and the floor surface, especially with soft floors, being the skid resistance also depending on the elastic deformation.
Therefore we realized and tested a new instrument capable of measuring the real skid resistance with all kinds of flooring materials, especially the soft ones.

Methods

The instrument is based on the drag method and consists of: a device capable of exerting a vertical force up to 250 daN; a test body in the shape of a claw, made of polypropylene, set on a sled; a pushing device capable of exerting a horizontal force so as moving the sled at a constant speed; a system of sensors and load cells measuring various parameters (vertical and horizontal force, tilting angle, penetration of the test body).
The ratio of the horizontal limit force, immediately before the claw displacement, to the vertical force gives the static coefficient of friction (COF). The same ratio during the movement represents a sort of dynamic COF, reproducing the variable reaction of the floor to the hoof while slipping.
In the first laboratory trials nine commercial flooring materials were tested. In a second trial, field tests were conducted in dairy houses.

Expected Results

From the measured parameters some indicators capable of describing the various aspects of the slip mechanism can be derived. Such indicators make it possible to evaluate and compare the performance of all types of flooring materials, especially the soft ones, and can indicate which characteristics (physical and geometrical) of the various commercial products can better perform in real housing conditions.

A farm configuration system to supply LCA inventory analysis needs for the assessment of orchard performances

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Keywords: farm ontology, farm modelling, energy analysis

Objectives

The possibility to certify the quality of agricultural productions is moving also towards the capacity to evaluate both the *C-footprint* and the *total energy consumption* (including direct and indirect components) related to the expected, or actual, behaviour of the farm. And this is nowadays particularly felt by farming systems ensuring high gross margin values, such as viticulture and apple-orchard systems. To this aim, the possibility to be able to refer to a single standard farm model is therefore increasingly strong. The paper provides the proposal of a new farm conceptual model through a farm configuration tool completed with database and related modular software interfaces for storing information of both the features of the production environment (suitable to be applied to any type of farm) and of its management dynamics.

Methods

Every farm can be always seen as a complex system, in which different type of components (climate, biological, technological, organizational, economic etc.) interact continuously. Because of this, the approach here proposed – independently on the farm problem to be analysed – requires that all the operational areas must be regarded with a level of detail consistent with each other, because each part affects the other directly or indirectly. This led to define a *farm ontology* (FO) based on a single general reference model, in which all the major entities of the system, with their associated relationships, are represented with a detail able to satisfy all most common applications across the farm itself, regardless of the farming system and the goals of the analysis at hand. This approach also ensures the implementation phase in a good degree of flexibility and modularity, especially allowing the integration of the modules related to *planning* and *monitoring* tasks.

Expected results

This FO facilitates any LCA application, allowing the use of common methodologies and databases in the early stages of *inventory analysis*. It has been recently applied to different apple-orchards systems in Northern Italy for a comparative evaluation of their performances with respect to the alternative cultivation practices there carried out.

Ergonomic postures assessment of workers during milking of she asses

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Keywords: WMSDs, operator safety, milking parlour, pit parlour

Objectives

The aim of this study is to examine the work position of the workers during the milking of she-asses due at risks deriving from repetitive upper limb movements. The assessment concerns the whole daily exposure to risk, taking into account the other activities carried out by the worker, that are strictly connected with milking. The analysis carried out in this paper will be useful to the farm in perspective of a plan based on increasing of head in number.

Methods

We selected three typical farms situated in Eastern Sicily (Italy). The first was on the slope of Mt. Etna at 550 m a.s.l.. It has around 80 heads, 40 adult female (18 – 20 in lactation), the second farm has around 12 female in lactation and is equipped with a bucket milking machine, while the third farm has 8-10 female in lactation and the milking is performed manually.
We assessed the musculoskeletal risk to the upper limbs by means of the OCRA Checklist (Colombini et al., 2005). The tasks processes were broken down into fundamental phases (CIOSTA – AIGR methodology). The examination of video films shot during the work period made it possible to deduce or confirm information about frequency, posture and the stereotypical nature of the work.

Results

The research shows that in she-asses farming workers are exposed to musculoskeletal risks due to repetitive movements and incorrect postures. Those equipped with a milking parlour with pit parlour show the same problems observed in cow farming, but the small number of head per farm makes small the connected health problems.

Climate conditions in a broiler house in Molise: experimental and numerical analysis

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Keywords: ventilation, temperature, poultry

Objectives

Ventilation flow in livestock buildings can determine the indoor climate and air quality and so it affects the welfare of the reared animals. The experimental study was carried out in a poultry house located in Molise (Italy).
The objective of this study was to find the optimum ventilation system to improve the rearing conditions in broiler house.

Methods

Climate conditions were evaluated by mean of temperature, relative humidity and carbon dioxide concentration; the BABUC/A, connected with tree probes, the BSU102 for temperature, the BSV101 for air flow and the BSO 103.1 for CO2 concentration, was used to detect the investigated parameters; detections were measured at 3 different heights, at 20cm from ground level, 100cm and 150cm, every 10 m all along the length of building.

Expected Results

During experimental trials different configurations of the ventilation system were tested and even if a little influence was found on CO2 average concentration, an irregular distribution was detected due to a wrong activation of the fans in the ventilation system.

New technologies in the cultivation of sugar beet (*Beta Vulgaris)* and their relation to yield and quality in Iraq

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Keywords: new technology, cultivation, sugar beet, yield

Abstract
The study was conducted in two well-known cultivation of sugar beet in Iraq using modern methods in agriculture and in both locations, the first site Rabia,(silty clay , texture ,lime 26.2 % , low Organic matter , P 12.5 ppm , K available 155,8 ppm. No salinity, Rainfall about 350mm/year. About 90 km Northwest of Mosul and Hawija(silty loam, texture ,lime 32,63% , Organic matter 1.53 % .P 8.74 ppm , K available 144,68 ppm , low salinity, Rainfall about 250 mm/ year, 120 km southeast of Mosul, using modern methods in agriculture compared to traditional methods used by farmers , We used the seeds (Monogerm) for the two Varities (Getan and Montirossa) , Horizontal Sprinkler Irrigation ,s Sowing seeds machine used to put the seed in same depth 3 cmm cultivated area 6 ha / site , distance between the Plant 18 cm , the distance between the lines 35 cm and thus became the cultivation of sugar beet is similar to the cultivation of wheat and barley , Fertilizer type NP 18:18 in three levels 480, 600 and 720 kg / ha, in addition to the use Herbicide and Insecticide during the experiments , the Results showed in the first field that the rate of production of the roots of 84.3 tones / ha and the percentage of sugar in the roots 15.2%, while the second site was root yield 87.2 tons / ha and sugar 16.3% and purity in the first site reached 77.5%, while in the second site had risen to 81.4%, and the results showed that the rate of fertilization 600 kg / ha is morally superior to other levels and in both locations. When follow-up farmer's fields using the traditional methods of agriculture have not increased the yield more than 52.4 tons / ha and sugar did not exceed13.1%.
This underlines the importance of fertilizer nitrogen and phosphate when growing sugar beet for the purpose of obtaining a crop of good economic and the sugar beet cannot be grown in both locations without fertilization and thus, the use of good technology in modern agriculture for sugar beet will gave farmer high yield and good quality, can be considered as the first crop is expected to produce farm profit bumper (Cash money) compared to traditional method sin the cultivation of sugar beet in Iraq.

Hazelnuts mechanical harvesting in Calabria: preliminary trials on work productivity

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Keywords: *Corylus avellana*, mechanical harvest, work productivity

Objectives

Hazelnut or *Corylus avellana* is an important species for many Calabrian hilly territories. It represents a key cultivation for those areas where there are no alternative crops, except forestry. However, it would require high levels of mechanization, especially for harvesting, which is currently one of the most expensive processes of the productive cycle; an operation that can engrave up to 40-60% on the sale price of the product, moreover to be time consuming if carried out manually.
The present paper intends to assess work productivity of a Calabrian farm during mechanical harvesting and preliminary post-harvest processing of hazelnuts.

Methods

Since hazelnuts are fruit that tend to fall spontaneously from the trees, they are mainly harvested using gathering machines from the ground. In the surveyed farm, they were first moved into the center of the rows using backpack blowers, and then gathered by mean of *"Jolly 2800"* harvester. Finally, they were transported to processing site where they were cleaned and dried.
Operational working time and productivity assessment have been made under C.I.O.S.T.A. ranking requirements. Time measurement started when the machine was positioned at the beginning of the row ready to start gathering.

Expected Results

Hazelnuts mechanical harvesting from the ground seems to be efficient even in complex situations. Indeed, such machines offer work productivity 3 or 4 times higher than manual harvesting. A significant decreasing of working times was also reached thanks to an accurate soil management that allows ground leveling and eliminates cultural residues and other impurities eventually present.

Topic 3

“Instrumentation, Equipment, Periodic Procedures and Tests”

Improving ROPS designs for agricultural tractors

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Keywords: rollover, protective, structure

Objectives

Tractor overturns are the leading cause of occupational fatalities on farms in the US. Rollover protective structures (ROPS) have been proven effective to reduce fatalities during tractor overturn. ROPS are designed to absorb energy resulting from the impact of the tractor with the ground surface during a tractor overturn, protecting the operator zone from intrusion of outside objects and exposure to the ground plane. A foldable ROPS equipped tractor offers greater mobility and more storage options as opposed to a fixed ROPS. Unfortunately, the time, effort, and safety risks associated with operating foldable ROPS limits their effectiveness. To improve ROPS designs, a efficient method of quickly design prototype ROPS is needed, as is a method to power the operation of foldable ROPS. The two major objectives of this project are to 1) develop and evaluate a computer-based ROPS design program that will assist in quickly developing ROPS designs based on tractor weights and dimensions and 2) design and construct a powered foldable ROPS.

Methods

The approach to the development and evaluation of a computer-based ROPS design program (CRDP) includes 1) providing tractor dimension and weight inputs, 2) ROPS construction design, and 3) outputting the ROPS design drawings.
A powered foldable ROPS retrofit was designed and built to raise and lower the ROPS at the push of a button utilizing the tractor's 12V power supply. Linear actuators remove or replace the locking pins, and a 0.05 hp gear motor raises or lowers the ROPS in less than 10 seconds.

Expected Results

A computer-based ROPS design program is being developed that will assist in quickly achieve ROPS designs based on tractor weights and dimensions. The final product from the model will be ROPS design drawings with specifications that can be used to construct the ROPS for testing.
A powered system which performs the raising, lowering, pinning, and unpinning processes would allow full utilization of the foldable ROPS while eliminating safety risks has been developed.

INTRAC: a research project on the integration of safety elements with ergonomics in the design of agricultural machinery

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Keywords: tractors, seat place, comfort

Objectives

Designing agricultural machinery firstly takes into account the specific technical aims the machine has to reach. Only then, if a compulsory standard exists, the safety aspects related to the operator, the environment and the road circulation are carefully introduced in the design in order to not penalize the main performance. Generally, the most evident and frequent risks are considered, and rarely the possible causes of occupational diseases - that are more subtle to detect, but unfortunately, irreversible – are considered.
The present research project aims to analyze and to propose methods and models to assess the level of integration of technical and safety aspects in the designs of different working place of agricultural machineries. Vibration, noise, microclimate conditions and ergonomics will be taken into account and innovative assessment methods, for the agricultural sector, will be introduced.

Methods

A new method to assign a vibration level to agricultural tractors will be attempted basing it on dynamic tests both carried on a vibrating bench, ISO standard tracks and field conditions. A prototype of portable, vibration counter will be assembled to validate the method. An industrial, patented "comfort index" will be used to assess the comfort level of different tractor-type seats introducing a new anthropometric-dimensional evaluation together with barometric and subjective analysis. Moreover, considering the growing number of instruments, displays, controls, etc. variably distributed on the dashboard of a modern tractor and their possible influence on driving stress and attention, a method of ergonomic analysis of the driving place based on eye-tracking technology will be introduced in order to measure the sequence of movements of the driver and his driving effort. Finally, a new method to realize user manuals will be proposed. An User-Centered Design approach will be used by means of usability tests with group of farmers to asses new editing proposal of safety and maintenance manuals.

Expected Results

Test methods and prototype devices to assess and control vibration and chemical dust exposition in tractor cabs will be proposed. Results from an integrated investigation on technique, ergonomic and anthropometric aspects of representative tractor driving places will be presented. An inedited prototype of user-centered safety manual will be published.

A recycling tunnel to reduce environmental drift in spraying goblet vineyards

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Keywords: Pesticide application, alberello, recovery sprayer

Aim

In order to fulfil the mechanisation requirements of goblet vineyards, the Section of Mechanics and Mechanisation of the Department DiGeSA of the University of Catania is developing and optimising an innovative multi-functional straddling frame, pulled from a conventional tractor, able to carry several tools, as vine-trimmer, sprayer, tools for soil cultivation, horizontal booms for herbicide treatment under canopies. Here we report about the first results of trials carried out with the frame equipped with a tunnel sprayer, able to reduce the environmental drift during pesticide treatments.

Methodology

The paper reports the results of both laboratory and in field tests, aimed at assessing the recovery features of the sprayer. Laboratory tests were conducted at fixed point, with no plant, and were devoted to the evaluation of the influence of pressure, number of open nozzles and tunnel width on the percentage of recovery. The experimental plan covered:

- Two pressures: 5 and 6 bar;
- Two tunnel widths: 90 and 110 cm;
- Three spray boom setups: 2, 3 and 4 open nozzles per side;
- Four replicates per each operating condition.

In field tests were conducted on a vineyard at beginning of setting growth stage, with pressure of 6 bar, 4 open nozzles per side and tunnel width of 110 cm.

Results

The results showed that laboratory tests provided a recovery ranging from 4% up to 83%, with general mean of 44%. The increase in pressure level improved the recovery, even if not statistically significant, while the increase in tunnel width made it worse ($p = 0.022$). Finally, the effect of the number of open nozzles was not statistically significant. The recovery during the in field tests ranged from 37% up to 53%, with general mean of 46%.

Conclusion and Perspectives

These first results induce to consider the tested machine an improved solution for pesticide application to low espalier and goblet vineyards with respect to conventional atomisers in terms of drift reduction and recovery of mixture. A more precise evaluation requires further experiments aimed at assessing working capacity, foliar deposit distribution on the canopy, and the optimal choice of the working parameters.

Development of a compact roll over protective structure for agricultural wheeled narrow track tractors

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Keywords: ROPS, computer aided design, finite elements non-linear analysis

Aim
Most of serious accidents occur when using a tractor which is not compliant with safety protection requirements, especially when the roll-over protective structure (ROPS) was not installed, or it was temporary folded in order to carry out some particular works. Even if two posts front mounted foldable ROPS can be folded down only for tractor storage or maintenance (as formally specified also in users' manuals provided by manufacturers), and always kept upright up the rest of the time the tractor is used, an high percentage of cases of non correct use of this type of ROPSs has been encountered. Thus, a specific research work was carried out in order to design a non foldable ROPS for narrow-track wheeled tractors, which provides rollover protection all the time without making agricultural works more difficult.

Methodology
For this purpose, a reverse engineering methodology was used to reproduce the main frame of a agricultural wheeled narrow track tractor in order to design a specific compact roll over protective structures (CROPS). The CROPS design is based on a parametric CAD model in order to verify its feasibility on tractor also with respect to ergonomic principles and working conditions (e.g. in greenhouses, under threes, etc.). Once the CAD parametric model of CROPS has been realized it has been structurally verified according to specific testing procedures and acceptance criteria by means of finite elements non-linear analyses.

Results
The research activity developed is focused on the possibility of reduce the overall height of narrow track wheeled tractors equipped with a ROPS while working in safety conditions. The main goal is to design a fixed compact structure which ensures a safety volume for the operator to be installed on tractors already in use.

Conclusion and Perspectives
At the moment several prototypes of CROPS were realized and they have been tested in the field, in particular in collaboration with farmers operating in the hazelnut sector. First feedback from these users can be considered very positive, since the functionality of the tractors with CROPSs is higher than the one of tractors equipped with traditional ROPSs. As far as costs are concerned, a detailed analysis could not be carried out yet, since only several prototypes were prepared so far. Anyway the cost of these handcrafts is comparable with the cost for realizing a two posts front mounted ROPS. Results obtained will be implemented in official national guidelines for both manufacturers and users for adapting their tractors in conformity with safety mandatory requirements. At the same time further work is foreseen to validate the CROPS for a larger number of different tractors.

Roll over risk analysis for agricultural self-propelled ride-on machines

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Keywords: required static stability angle, crops typical angle, soil mesh

Aim
Many agricultural self-propelled machines present roll-over risk without fitting a ROPS. This problem has been aroused by the Italian occupational safety authority (INAIL ex ISPESL) and, nowadays, a specific standard EN ISO 16231-1 is being developed concerning roll over risk assessment and technical measures to reduce it. In the mean time, INAIL ex ISPESL during its market surveillance activity had to deal with several machines which were not in compliance with the essential health and safety requirements *3.4.3 roll-over and tip-over* of annex I of machinery directive 2006/42/EC. The main typologies of the encountered machines were grape harvester, hazelnut harvester, liquid fertilizer sprayers and hay rakes. In many of these cases the roll over risk was not deeply investigated by the manufacturer even if it was accounted for.

Methodology
In particular, the first step for developing a proper risk analysis according to the standard ISO 16231-1 is to verify if the machine is designed so that its Static Overturning Angle (SOA) is higher than the Required Static Stability Angle (RSSA). The RSSA is obtained multiplying the maximum longitudinal and transversal percent slope from horizontal in which the crops normally grow by a safety factor. Considering that if the SOA is higher than the RSSA it is not necessary to set up other technical measures to reduce roll over risk, it is strictly important to properly measure the crops typical angle. Hence, INAIL ex ISPESL with the technical support of Department of Rural Development of Italian Ministry of Agriculture is developing a specific investigation in order to define the typical slope of the principal crops in Italy.

Results
The experimental research developed is based on some information collected in the national agricultural information system data base enriched by the information acquired from a detailed satellite map of Italy interlaced with a global position system analysis. The main target to achieve is to arrange the soil where the crops normally grow in Italy in slope ranges with respect to the agricultural self-propelled ride-on machines used on. As a first result, the lowest slope where agricultural self-propelled machines are used during working activities is about 36% (20°).

Conclusion and Perspectives
The first data acquired from this investigation enable to set the minimum value of typical operative slope for agricultural self-propelled machines to be used for the risk assessment related to stability of this kind of machines. Continuing and refining the research should lead to better identify the maximum operative slope of the most common typologies of agricultural self-propelled machines. For a deeper analysis of the phenomenon is foreseen a second phase of the investigation consisting in equipping some machines with a slope indicator recording system.

Human relaibility at electrical equipment service on agroindustry companies

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Keywords: human reliability, PSF

Objectives

Reliability of the electromechanical system couldn't be better than human reliability, so we must use information about human reliability in analysis of this kind of systems. Performance shaping factors (PSF) are differs from sector to sector so our aim is to choose PSF's for electrical equipment service workers using expert judgment, calculate PSF weights and develop model for working places examination and dynamic simulation of system degradation process using fuzzy sets theory.

Methods

We have made expert survey in 2010 year for PSF choosing and weights calculating. The target group was middle-level management of the agroindustry companies and electrical equipment service companies. Using our SAM method modification we receive weights of PSF's and define core of them. The main factors, with respect of results of our survey, are: small experience of work, carelessness, badly formed specialist, unconscientiousness, bad emotional condition. So, we can use survey results for quantitive evaluation of reliability of "man-machine" systems.

Expected Results

Awaited results of our work are: model (dynamical and static) for "man-machine" reliability and software for reliability calculation, based on FOSS. The basis of our system is analytical module, using KNIME platform and Repast or Netlogo.

Environmental assessment of livestock farms: a comparison of different methods to estimate emissions to air

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Keywords: pollution, models, IPPC

Objectives

Emissions to air, water, soil resulting from livestock are determined mainly by manure handling. In order to evaluate the environmental impact from livestock farms and to identify possible actions to reduce pollution sources, suitable methods, generally based on models, should be applied. The aim of the work is to compare the emissions values obtained using different methods in practical farms in order to improve the applicability of the methods and support an objective assessment of a farm.

Methods

The tools or methods used and the different pollutants considered are summarized below:

- Erica developed by Lombardy Region to support IPPC applications (NH_3, CH_4 and N_2O);
- ValorE expert systems to improve the management of livestock manure and the environmental protection of the territory of Lombardy (NH_3, CH_4 and N_2O);
- Corinair (COoRdinated Information Air on the Environment in the European Community) Tier 1 and Tier 2 (NH_3, PM_{10} and $PM_{2.5}$);
- IPCC (Intergovernmental Panel on Climate Change) Tier 1 and Tier 2 (CH_4).

For the comparison we used data from eight farms subjected to Integrated Pollution Prevention and Control (IPPC) procedure, collected from the applications and verified visiting the farms in connection with the official routine inspections.

Results

The results highlighted huge differences both among farms and methods.
For example, with regard to emissions of NH_3 the farm values ranged from 150 to 2000 kg ha^{-1} $year^{-1}$. For the same farm using different methods the variation can be more than double (for example from 12,000 to 26,000 kg of NH_3 $year^{-1}$).

Conclusion and Perspectives

The results of this work show that the situation of the livestock farms would require a significant intervention for reducing emissions, although they have been authorized for the purpose of the legislation. The use of different methods has shown that despite the results of the quantities of substances emitted is very different, the relative rank of the farms is always similar. This confirms the validity of these tools to identify the degree of reduction that can be achieved with mitigation techniques. However they must be used with caution to determine the absolute values of emissions.

Accidents analysis during the chainsaw use: prevention and protection measures to reduce injuries

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Keywords: statistics data, chainsaw and electric saw, software

Objectives

The chainsaw is an equipment of large use within the wholes agricultural, forestry, professional and hobbyist worlds. This work wants to analyze the accidents situation in professional compass and in homely contest too in order to study some new solution for the risk management.

Methods

From the methodological point of view, this work analyzes and compares different types of national data, collected from statistics data collection, and from non-conventional sources, that is all the news chronicles that quotes accidents connected to the use of chainsaw.

Expected Results

The results define and reaffirm two elements of prime importance; 40% of accidents results serious/deadly with 40 days of danger list on average and indexes of permanent invalidity (referred to amputation of hand's finger or feet's finger); besides the head is confirmed as major exposed zone and related to the operator's dead (most of the deaths indeed happens due to crash with blade, facial trauma or violent collision with cut plant parts). This work wants to become a starting point for the definition of new solutions: first of all represented by: the development of a quick software for the assessment of competences in forestry and hobbyist environment, that could represent an introductory instrument for the risk management, both in professional and homely contest.

Dynamic simulations to test the protective safety gloves: first results of a new methodological approach

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Keywords: PPE, choice, technical standards

Objectives

Gloves are largely diffused as work tool in many activities. According to the Italian Law in force concerning health and safety at the workplace, the employer must endow of special PPE (Personal Protective Equipment) the workers (element not always effected) after the risk evaluation in which he has identified the characteristics of the PPE, according to the specifications of the work activities. On the market there are many brands of gloves with technical standards (EN 388 for protection against mechanical hazards and physical). However, there are still many accidents where gloves didn't have the appropriate technical measures able to protect the worker.

Methods

This search analyzes, through techniques for the evaluation planned for this study, the effectiveness of the gloves in real working conditions. From a methodological point of view, a protocol has been elaborated in order to test in the real sceneries the efficiency and the effectiveness of these PPE.

Expected Results

First results show that the classes of resistance are not very often appraised by the employer and in this way the gloves used in agriculture don't always guarantee good performances in terms of effectiveness. Besides, the protocol defines a new methodic that could directly be gifted in the agricultural firm.

A software for evaluating the radial eccentricity of agricultural tires for ride comfort test

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Keywords: tire's profile, resonance, solicitation

Objectives

The increasing speed on road surface of agricultural tractors has pointed out the attention on comfort and handling performance both for ergonomics and law requirements.
One of the factors that influences the cited parameters is the solicitation originating from tires caused by the revolution of the tires in their resonance frequency.
In fact, a tractor could have vibrations also on a surface levelled, as asphalt, because each complete rotation of the wheel induces a periodical solicitation on the relevant axle that is proportional to the amplitude of the tires' eccentricity.
It's necessary to evaluate this variable of the tire for test on whole body vibration of a tractor driver in transport conditions.
About this topic, the EUWA (Association of European Wheel Manufacturer) has developed a specific standard for the rims: "3.21/2009 High Speed Wheels for Agricultural Tractors - Geometrical uniformity of wheels and first harmonic point", but no rules are available for the complete wheels, including tires.

Methods

The CRA-ING Laboratory of Treviglio, Italy, has developed a method and the relevant software for evaluating the amplitude of the eccentricity of the tire based on the harmonic analysis of the tire's profile.
The software regards only the first harmonic as the interest is focused on the low speed of the tractor but the considerations are valid and easy to extend also to the superior harmonics.

Expected Results

Conceptually, the measure of the amplitude of the eccentricity of the tire (TI) will be that of the tire with rim, the wheel (WH), less that of the rim (RI). Each single data of the wheel is subtracted to the relevant of the rim so that TI=WH-RI.
Moreover, the software allows to define the correct match-mounting of the low spot of the tire with the high spot of the rim to minimize the value of the eccentricity of the complete wheel.

A machine to improve the safety during the chestnut mechanical harvest in steep zone

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Introduction

The greatest part of the zones where is performed the chestnut cultivation, is characterized from high value slopes. The harvest machines available on the market still have notable operational limits as it regards the soil slope (steep zone), sensibly reducing their performances with soil slopes higher than 15%. In such cases aspirating machines are used with aspirating tubes managed by operators that climb them along the steep slant to perform the chestnut harvest. This is a danger situation, in how much the worker can slip on the steep slant (because of the soil slope and/or moisture). In fact the steep zones also result particularly insidious for how much it concerns to the safety on the work, and the accident risk it is always present to the point to strongly discourage the chestnut harvest with a further damage for the economy of the agricultural compartment already penalized by contingent factors of financial recession.

Methods

It has been set up a machine with small dimensions such to be tele- driven in the steep zones. With the aid of specific software, it has been possible to perform a simulation of the various runs planning soil slope higher than 35%, spaces wide maximum 80 cm and backs high 30 cm. Subsequently it has been realized the machine prototype. With the aid of the software Solidworks has been designed the 3D model to verify the compatibility of the considered dimensions of the same with the hypothesized spaces. The vehicle is composed of a tracked wagon surmounted by the aspirator and by the whole equipment of harvest. This machine is completely driven by wire. The operator has only to start the machine and to drive it from remote, avoiding so that the operator has to climb for steep slant exposing himself to danger conditions.

Results

The harvest tests have been performed in only one passage, and they have been aimed to evaluate the functional and operational characteristics, related to the surface of an hectare. The tests of the machine prototype have been conducted with a speed of 1,8 km/h, with a soil moisture of 12%. Under these conditions, in the first tests, the working operational capacity of the considered machine has been satisfying.

Environment safety and people health protection through innovative changing in making agricultural production using nanotechnology

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Introduction

Nowadays for effective making animal husbandry production in agriculture economically developed countries are more and more wildly using synthetic substance considerably increasing efficiency of farming sector for the purpose of deriving the highest possible income. This process is getting dangerous not only for animal health but also for people who take these products. For making environmentally safe production without decreasing economic effectiveness of the sector it is offered to change synthetic preparations to vegetable ones.

Methods

In order to do this in «Novgorodskiy Agrotechnical College» a scientific educational production laboratory was created. This laboratory is used for design and production overcritical *carbonic acid* extracts – feedstock for feeding-stuff production, veterinary, food, pharmacological and cosmetic industry. Growing in region cultivated and wild plants such as beet, carrot, calendula, vetch, mugwort, fir and pine needles, leaves of birch etc. serve as raw materials for the laboratory. Derived extracts practically imitate input materials at that substances are in proportion, peculiar to a vegetable. One of the way of using them efficiently is feeding-stuff production. Adding them to feeding blend allows not only speed up the growth, development and fecundity but also increase immunity of livestock and poultry to infections, stimulate immune response to vaccine, activate metabolism.

Conclusions

To date laboratory is certified for doing tests according to European techniques, production is also certified. Main experts had gone through a course in Europe, India, China. Collaboration is maintained with European companies: Flavex naturextrakte GmB H (Germany), Prozesstechnologie Gesmb H (Austria) and also Novo Agritech (India).

Proximal optical tester for precision agriculture and environment protection

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Keywords: vegetation index, N rate, wheat crop

Objectives

The diagnostic of plants state is carry out in precision agriculture to apply N rate fertilizers, maintain of soil fertility to receive of high crops, improvement of their quality and environmental protection in connection with nitrogen over application. The special field optical instruments are widely using for this diagnostics. Russian field active proximal optical tester with built - in artificial illumination allow us to make measurements reflectance in visible Rv (0.4-0.7mkm) and near infrared Rir (0.76-1.1mkm) ranges with uncertainty 0,5%. We used the simple vegetation index VI = Rir / Rv to evaluate plants state. It is known that over application on N leads to low N recovery efficiency and risk of N pollution of soil and ground water. The main problem is to define the N threshold level N* and its optical indicators.

Methods

The spring wheat growing on sod-podsol soil on the field of Leningrad region was studied.
Using regression method we constructed a number of Response functions (RF) on the special reference plots with different N rate fertilization in soil.
Analysis of variation the main RF as a dependence VI from N rate **VI (Nr)** we could to define ecological soil N-threshold **(N*)** and an optimal N rate fertilizer when RF have maximum value and the best plants state **VI*** (main optical threshold).
From RF (dependencies **Rv (Nr)** and **Rir (Nr)** we received the information about threshold levels **Rv*** for chlorophyll **Chl*** and **Rir*** for crude protein **Pr*** content in leaves.
We suppose that the using of numbers of the optical thresholds **VI*, Rv*** and **Rir*** a more full describes ecological state of crop on the ontogenesis stages.

Expected results

Using complex of our testers (proximal and contact) allows us to increase the accuracy of definition of the optical thresholds.
We search for partners for testing our instruments in Russia and abroad.

Evaluation of mechanical and rheological aspects of the malaxed olive paste

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Keywords: malaxer, oxygen, apparent viscosity

Objectives

A malaxer prototype has been developed and it is able to control the oxygen both in the head space and in the paste. Besides, an innovative system to inject oxygen has been introduced on this machine. To investigate on the mechanical parameters a torque monitoring system was implemented on this prototype. This in order to evaluate the effect of different process conditions on olive paste product from a structural point of view.
In this research has been studied the correlations among oxygen dissolved in the malaxed olive oil paste and rheological properties. The knowledge of the rheological property of the olive oil paste is essential to optimize the performance of the decanter. The torque and viscosity correlation is important to define an in line parameter directly detectable during kneading to understand when the paste is ready to get the next phase.

Methods

Experimental tests were done. In the trials, the malaxer prototype was filled with olive paste. A different malaxing condition were chosen (air; nitrogen; oxigen inject). During the malaxation process the torque on the reel were measured using a rotating torque transducer RT2 (AEP) that was fixed between the motoreducer and the reel. Rheology measurements were carried out using a Brookfield rotational rheometer (R.v model; Brookfield DV-II+Brookfield Engineering laboratories, Inc., Stoughton, MA, USA) equipped with interchangeable disc spindles, 1–6 (model RV/HA/HB; Brookfield DVII + Brookfield Engineering laboratories). To interpret the experimental results in terms of viscosity, the torque-speed data and scale readings were converted into shear stress–shear rate relationships using numerical conversion values (MITSCHKA, 1982).

Expected Results

This study examines the mechanical and rheological aspects of different olive oil malaxed paste. The results indicates that the oxygen inject during malaxation is a factor that influence the torque and the viscosity of the paste.
The viscosity of the investigated olive oil paste showes dependency on the oxigen concentration, as well as on the time of malaxation. The viscosity decreases when the malaxation time increases. As regarding as the data of the torque a progressive decrease of the torque during malaxation process is observed too. The lower viscosity and torque value are observed when oxygen is inject in the olive paste.

Topic 4

“Safety Health and Welfare in Building”

Risk factors in the wine industry

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Keywords: safety, health, buildings, machinery, wine

Aims

The study examines the "cellar" industry in its various aspects (technology, plant engineering, construction) to identify potential hazards in order to subsequently indicate the actions that can eliminate or reduce the connected risks. Risks for workers will be examined for first , classified according to the essential elements of the cycle of transformation from grapes to wine, and then the dangers associated with them arising from the application of the HACCP rules on wine .

Methodology

IDENTIFICATION OF SOURCES OF RISK

The risk factors for injury in the cellar, limited to the processing plant, may concern:

A) the nature of the plant: the presence of electrical equipment; use of plant and machinery; risk of injury due to moving parts or bad anchoring of containers; exposure to noise; handling of heavy loads; steam plants, cryogenic plants, etc.

B) building and construction in general: electrical wiring; wells, grids, ladders and catwalks; slippery floors and transit surfaces; emergency escape routes; warning signs.

C) the processing cycle: the presence of CO_2 produced by alcoholic fermentation; use of hazardous chemicals (SO_2) and aggressive detergents.

Results

The cellar is perceived as a quiet and safe place. Indeed, the precise application of the provisions contained in Legislative Decree 81/2008, showed that, even if maintaining controlled levels of hazards, building structures and more again the equipment necessary for processing, may, if not properly constructed and maintained, manifest serious dangers related to bad or improper use of machines or inappropriate choices of building materials. It has also been demonstrated that the corrective measures set by the application of safe working practices improve the organization of the production cycle. Even in terms of healthiness of the product, the manufacturing process, in the articulation of its main processing stages such as crushing and storage until bottling and sale, does not present risks of particular note because wine is not a suitable substrate for the development of pathogenic micro-organisms harmful to the consumer.

Conclusion

Anyhow, it must be considered that a chemical contamination can exist, resulting from failure of the correct period of suspension of pesticides used in the defence of the vineyard, as long as microbial cross-contamination with external environments, as well as sporadic risk of particulate nature due to the presence of fragments of glass inside the bottle. So nothing can be left without a thorough general check.

Estimation of the frequency, severity, and primary causative factors associated with injuries and fatalities involving confined spaces in agriculture

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Keywords: confined spaces, agriculture, suffocation, entrapment

Objectives:
The objectives of this study were to estimate the frequency, severity, and primary causative factors associated with injuries and fatalities documented in agricultural confined spaces. The data utilized in the study is contained in Purdue University Agricultural Confined Spaces Database (PACSD).

Methods:
A total of 1,282 cases involving confined spaces in agriculture were mined from the database of farm-related fatalities and injuries maintained by Purdue University. These incidents were documented during the period 1964 and 2011. Data was gathered from a variety of sources, including death certificates, police reports, newspaper clipping services, litigation documents, and online searches using keywords such as: "death confined space agriculture", "death grain bin", and "manure pit". Documented cases were, when possible, cross referenced and verified with other agricultural safety specialists who publish annual summaries of farm-related fatalities and injuries. All data was coded using a standardized process and utilized a panel of experts, when needed, to help in data interpretation. The database is not considered comprehensive but represents the best view of the problem in the U.S. that is currently available. It is believed that non-fatal incidents are significantly under reported due to the lack of a uniform required incident reporting system.

Results:
The average number of documented incidents over the 48-year period was approximately 28 with the average increasing to over 51 incidents per year during the past decade. The highest number of cases was reported in 2009 and 2010 which also had the highest number of entrapments in free flowing grain. Males accounted for over 96% of the total, and youth under the age of 16 comprised nearly one out of five cases where age could be determined. Over 65% of the cases resulted in multiple fatalities including two that resulted in five fatalities each or a total of ten deaths. Nearly 75% of the incidents involving youth were fatal. Four types of facilities accounted for the overwhelming majority of cases; grain storage and handling; livestock manure storage and handling; agricultural transport vehicles; and forage storage structures. These facilities represented over 96% of all cases. The single most significant contributing cause was out-of-condition grain that prevented normal unloading from storage units and resulted in workers entering the structures to aid in grain removal. Key recommendations included the need for enhanced engineering standards that focus on the safety of agricultural workers exposed to confined spaces and greater emphasis on increasing the level of awareness of the hazards of confined spaces, especially targeting youth working on farms.

Productive aspects and acoustic levels in a modern sorting and calibration plant for kiwi post-harvest processing

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Keywords: work productivity, quality control, acoustic pollution

Objectives

The rising social and economic interest developed over the time for kiwi led to the creation of sorting and calibration lines constantly more sophisticated able to reach high levels of automation for the execution of the diverse post-harvest processing phases. But while technological progress allowed to increase sensitively work productivity and to execute a greater product quality control, it has also provoked the increasing of hazards incidence and health problems for machines operators.
Acoustic pollution particularly results as one of the most important factors of hazard for exposed individuals, since the noise is able to determine irreversible hearing loss and often the complete deafness too.

Methods

The present work aims, on one hand, to examine the productive aspects of sorting and calibration plant through the analysis of work cycle that is achieved therein, on the other hand, it intends to assess the dangerousness of noise phenomenon through the survey on exposition levels faced by operators.

Expected Results

The survey highlighted a rather serious situation of the considered sector in terms of wok safety conditions. Indeed, the obtained results do suggest that additional research efforts and targeted worker's training are required to improve safety conditions that should become a sort of discipline in daily operations. Unfortunately complete regularization and adoption of safety-targeted adjustments in the surveyed sector seem hardly feasible in the short term, not only for the technical features of the plants in question, but also and above all for the impossibility of adopting expensive measures within such a highly competitive sector almost exclusively based on price policies.

Reduction of the risks related to falling from heights in processes of greenhouses roof maintenance

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Keywords: safety, falls, agriculture

Objectives

The present communication tries to show the important safety deficiencies of greenhouses roof maintenance operations, because these operations had to carry out by workers at 4-5 meters height. In this context, the objective of this work will be the design of a new mobile equipment adapted to the roof greenhouse shape in order to increase workers safety during maintenance operations as roof shadowing, cleaning and plastic cover change.

Methods

This investigation began with the study of the state-of-the-art of the maintenance operations in greenhouses roof, including scientific publications and patents, and simultaneously, an evaluation of the film cover renovation works in two multispan greenhouses was carried out. Collected data in these two greenhouses was used to make an evaluation of labor risks following the methodology proposed by the National Institute of Labor Safety and Health in Spain (INSHT), classifying the risk levels for each one of the identified dangers. Finally, a technical solution was designed to guarantee the safety in these operations.

Expected Results

The literature reviewed revealed at the moment that advances in this area of greenhouses construction are few, with no methods or designs that facilitate the accomplishment of these operations in a safe way. Nevertheless, the means and procedures used in the maintenance operations show great safety deficiencies, verifying that, in the majority of cases, the legal measures proposed to avoid or to reduce these risks are not applied.
In this communication, design and operation of a new safety element has been described. This element has been tested and demonstrates that improves the working conditions avoiding risks of fall from height to which the worker are exposed.

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Safety equipments in an equestrian facility

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Keywords: horse, risks, prevention

Aims

In recent years an increased attention has been paid to the risks that can emerge within the equestrian environment. In fact, the activities that are carried out every day, whether of working or sport nature, can cause serious traumatic events. The main problems are related to the following risks: biological, physical contact, chemical, electrical, mechanical and can be contained through proper training and information of workers. The likelihood of accidents can be reduced also applying appropriate behavioural requirements and certain quality and construction parameters used in structures. Inside the equestrian facilities all the main safety systems should be well indicated, also through appropriate signs.

Methodology

Analysis and definition of risks involves great difficulties due to the presence of horses both in permanent structures, that in an unknown environments such as a sport or show event. Safety rules should always be known to all the operators and put into effect in every phase of any activity that contains an interaction between man and horse or horses' dedicated structures and should be respected, in every least detail, during the carrying out of any procedure. Beyond this it is very important to check out the construction characteristics of the facility, laying on eye on dimensions of stalls, doors, passages and every place where a horse must transit along with a person. All kind of plant, installation and machinery, such as treadmills, drying lamps and so on, must strictly respond to the rules and be maintained in perfect conditions of use and each worker must know how to use them correctly.

Results

Analyzing the procedures aims to encode and teach management habits for every workers' life and safety in the contact with horses and at the same time they assure to the facility good operating conditions and productivity that will make it competitive towards those firms in which safety fundamental concepts are lacking.

Conclusion

A working activity based on safety of structures, plants and procedures and on the application of rules of prevention surely brings to the appeasement of operators involved which will be able to operate in greater serenity conditions.

The foodservice sector: assessment and operative instruments to improve the safety

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Keywords: risk analysis model, catering, accident

Objectives

The last ten years have been for the catering at a remarkable growth: "eating out" is now a growing habit for common food style. The foodservice centers, consequently, increased their performance by increasing productivity and the technological level but, at the same time, still represent a context where worker safety is put at great risk because, especially in the expressed productive organization (the so-called fresh-hot link), the times are very concentrated in order to prepare all meals provided within the time required by the customers. Think of a great cooking center, having to produce a few thousand meals, must concentrate all activities in the early hours of the morning in order to allow the logistics deploy on time.
The aim of this study was twofold: firstly to identify the major accidents reported in a catering company in three years, the other to present an equipment analysis methodology in such a way that we can provide, to those who must manage them, an approach based on "risk analysis model".

Methods

Data were collected starting from the analysis of all complaints for accidents recorded in the three years 2006/2008 occurred in Serist S.p.A.. The details were then divided according to type of injury suffered by the worker, the place where the accident occurred, the days of prognosis and possibly the equipment that caused the damage. Through the objective analysis of these data were constructed graphs for equipment deemed most dangerous by relating the severity of the damage with the probability (risk analysis model): then actions to be taken in order to manage equipment safely were identified.

Expected Results

In the period considered there were a total of 526 accidents: the main causes were improper use of cutting elements (23%), the fall due to slippery floors (16%) or tools (22%) and finally burns (7%) plus other minor incidents.
The equipment analyzed, therefore, were the knife, the carriage and the slicer. Some graphs were constructed allowed the identification of actions to be taken to limit the injuries that lead to more serious damage.

Topic 5

“Automation, Remote Control, Robot and Innovative Vehicle”

Expert system with cloud database for optimal management of Fruit and Vegetable traceability

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Keywords: cloud, spraying, greenhouses

Objectives

The fresh fruit and vegetable sector is characterized by important number of treatments, whose operational complexity has increased with the release of new regulations and protocols which in fact significantly increases the risk for farmers, to carry out treatments to the outside of the guidelines that characterize each protocol. The paper presents an analysis of the initial work with the traceability requirements and development of a working prototype using the Delphi language, drawing on a database of rules distributed via cloud.

Methods

The requirements of the the application have been discussed by meetings with stakeholders, the chemical laboratory of the Chamber of Commerce of Turin and the Italian Confederation of Farmers. It 's been put in place a system of complex rules to implement the expert system and manage without errors treatments to fruit and vegetable crops in greenhouses and open field. The general rules are implemented for each chemical and are based on the following parameters: Name of commercial product; Adversity; Crop, Phenological stage; Protocol; greenhouse / open field, date of expiry of registration of the chemical.
The combination of the above parameters yield to complex detail rules, based on the following parameters: Maximum dose: L or kg of product per hectare (possibility of treating the entire surface or only the cultivated area); dose per hl: specify the amount of water must be used for the mix; safety time: days after treatment before the FFV can be collected; maximum number of treatments per crop, maximum number of treatments per family of chemicals; maximum number of treatments alternatively within a certain family of chemicals.

Expected Results

The procedure developed will allow for operators to verify, before treatment, which lots could be sprayed without problems (Green), where it can be done the last time (yellow light) and where it can not be carried out (red light). All this taking into account the different protocols of cultivation practiced by the farmer. The ultimate result should be a basis of knowledge of the rules governing the execution of the processing plant crops, which should allow operators to perform the treatments safely, in compliance with the rules and discipline imposed by the large retail chains or by national mandatory rules on the subject.

Automation and robotics for workers health and safety improvements in pot-plant nurseries

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Keywords: robotics, pot-plant nurseries

Objectives

The pot-plants sector is very important in European agriculture, and employees a considerable number of workers. Most operations are still manually performed and many of them are critical for worker health and safety. Pots handling is one of the most repetitive and heavy operations forcing workers to hazardous postures for musculoskeletal apparatus, whereas the high number of pesticide applications determines a strong exposition to toxic substances.
Robotic systems and automated machines able to perform repetitive and/or dangerous tasks could significantly facilitate and make safer the work in pot-plants nurseries where millions of pots are grown every year.
This paper discusses operations that can be conducted by automated, specific machines and presents the design of a multipurpose autonomous robot customized for pot-plants nurseries as well as other protected cultivations.

Methods

Pot-plants are usually arranged in plots in greenhouses, walks in tunnels or outdoor. Crop unitary operations have been analysed observing workers in different periods of the crop cycle. The proposed robot has been conceived to operate on crops navigating over plots in autonomous way, by means of a ground reference consisting of a plastic strip laid on floor. The basic element is a four driving and steering wheels rover able to host different kind of implements. Propulsion and steering system will be implemented by electric motors installed into four wheel-modules and supplied by a generator or, in some specific cases, batteries. In order to change the wheels track, adapting it to the plots and corridors width, wheel modules are connected to the rover chassis by means of a pivot system.

Expected Results

The introduction of a multipurpose autonomous robotic platform in the pot-plants farms will lead to significant improvements in terms of work safety as well as reduction of production costs. Pesticide applications will be carried out in automatic way avoiding the exposition of workers to dangerous compounds. A precise distribution will also allow reducing the overall quantities of chemicals as well as the amount of pollutant scattered in the environment. At the same time, a number of highly repetitive tasks, such as pots handling, trimming and granular fertilization, could be automatically performed by the robotic platform developing specific implements.

Design of a remotely operable sprayer for precision farming application

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Keywords: robot, safety, modular sprayer

Objectives

The aim of this research activity is to develop a modular, fully customizable and remotely operable sprayer. This kind of device can be installed on-board a standard farm tractor/support machine or to be integrated on-board the U-Go robot that is under development with a joined project between the DiGeSA and the DIEEI and co-founded by MIPAAF. The aim of the U-Go robot is to improve worker safety level during harmful operation inside greenhouses as chemicals distribution. The robot has autonomous navigation capabilities and the on-board computer can send command to the sprayer and receive information from the sprayer sensors. All the sprayer parameter can be accessed and modified during operation. These features are not very common in commercial computer controlled sprayer unit that normally use only a touch screen panel as user interface.

Methods

The device is composed by a hydraulic subsystem and an electronic control unit. The hydraulic part of the sprayer is composed by a 130 l tank with 5 l hand-wash separated reservoir, an electrical actuated pump, a manual pressure regulator, an electric flux regulator, a pressure sensor, a flow rate meter and two electric on/off valves. These two valves can supply two vertical bar equipped with anti-drop, high pressure nozzles for spraying operation inside a standard tomato greenhouse. The pump has a nominal maximum pressure of 25 bar and a maximum flow of 20 l/m. The electronic control unit is composed by two digital/analog I/O modules with Ethernet interface that allows to remotely operate the different hydraulic component and read information from sensors and to manage other control unit parameter. The Ethernet interface will allows remote operation from the robot on-board computer as well as any other remote station with an internet connection using a suitable command set. The proposed architecture, being very modular, will allow component (sensor, actuators) to be added in an easy way.

Expected Results

At this stage the sprayer unit is being mounted on-board the U-Go robot. In the meanwhile the electronic control unit is under development at DIEEI laboratory and preliminary functional test has been performed. In order to make totally transparent to a mid-level user all the low-level hardware behaviour, a suitable software server has been developed. In this way, user command can be sent as high-level string and sensor information can be received as numeric text string. As the whole system will be integrated, complete test will be performed.

Designing and testing a new small tractor prototype for the mechanisation of terraced-vineyard farming systems in South-Tyrol

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Keywords: articulated tractor, small mechanization, tractor stability

Objectives

A new tractor prototype suitable to be used in extreme slope and/or terraced conditions of hilly and mountain areas is here proposed and described. It was firstly designed to address the problem of working in vineyards trained with the so-called "pergola" system, that are still very common in South Tyrol being particularly suitable for the typical vine varieties here cultivated (*Lagrein* and *Uva schiava*). "Pergola" is often associated to terraced vineyards, and this involves many mechanisation problems to be solved mainly due to: i) very narrow lines of traffic in the inter-row spaces, often lower than 1,00 m and with the presence of roll-over risky, high steps downstream, ii) an useful height under the arbour that is commonly lower than 1,80 m (often limited to 1,60 m) and that makes difficult the use of normal tractors with their ROPS in ordinary position during operation; iii) the presence of steep and very narrow-angle curves in the row heads, with great difficulties of manoeuvre.

Methods

This work reports on the activities of a working group that was established to find solutions to overcome the above problems. The group was composed of a local machine constructor (WM srl – Prato all´Isarco, BZ), three vine-growers and a team of researchers coordinated by the FUB. The collegial work led to the development of a new type of tractor having in short the following features: a) an unconventional design concept, based on an articulated body with the front part formed by the frame supporting the engine with the other main related components, over which the driving seat is directly placed, and the rear part acting as implement-carrier, and b) a fully hydraulic-power system, supplied by a 20-kW diesel engine linked to two independent hydraulic pumps (one supplying power to wheels and the other providing hydraulic torque to the rear-mounted implement).

Results

Both laboratory (based upon official OCSE measures) and field tests were carried out on the prototype. The machine proved to be very suitable to operate in extreme slope and terraced conditions. Further improvements have to be yet considered to fully meet safety standards prior its final commercialization.

First investigation on the applicability of an active noise control system on a tracked tractor without cab

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Keywords: sound pressure level, attenuation, agricultural machine

Aim

In last years, several research teams pointed their attention on the application of active noise control systems (ANC) inside the cabs of agricultural tractor and industrial vehicles, with the purpose of reducing the driver exposition to noise, that is only partially controlled by the frame of the cab.
This paper reports the results of a first experience that aimed at verifying the applicability of an ANC on a medium-high power, tracked tractor without cab.

Methodology

The tested tractor was a Fiat Allis 150 A, equipped with rear power take off, used in the execution of deep primary tillage in compact soils. It is a tracked tractor without cab, with maximum power of 108.8 kW at 1840 min^{-1} of the engine. The ANC consists of a control unit box based on a digital signal processor (DPS), two microphones, two speakers and a power amplifier. The instrumentation used in noise data collecting and processing consisted of a multichannel signal analyzer (Sinus - Soundbook), a ½" microphone capsule and an acoustic calibrator, both Bruel & Kjaer.
The study aimed at evaluating the behaviour of the ANC by means of tests carried out under repeatable conditions, characterized by pre-defined engine speed values. Three replications have been made for each engine speed. The sampling time was 30 s. Two series of tests were performed in order to compare the results observed with the ANC on and off. The engine speed adopted in the study ranged from 600 min^{-1}, up to 2000 min^{-1} (maximum speed) with steps of 100 min^{-1}.

Results and Conclusions

The ANC proved to be effective particularly in the interval of speed between 1400 and 1700 min^{-1}, where the samplings have been intensified, adopting steps of 50 min^{-1}. In such an interval, the attenuation observed with the ANC system on appeared evident both as weighed A sound pressure level (from 1.29 up to 2.46 dB(A)) and linear (from 4.54 up to 8.53 dB). The best performance has been observed at the engine speed of 1550 min^{-1}, with attenuations, respectively of 2.46 dB(A) and 7.67 dB. Outside of the engine speed interval 1400 - 1700 min^{-1}, the attenuations always resulted lower than 1 dB(A) for the weighed A sound pressure level and between 0.66 and 7.72 dB.

Detecting tomato crops in greenhouses using a vision based method

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Keywords: precision farming, computer vision, support vector machine

Objectives

Precision Farming is generally defined as information and technology based farm management system to identify, analyse and manage variability within fields for optimum profitability, sustainability and protection of the land resource.
The use of intelligence systems could significantly contribute to increase overall performances in intensive culture management and production efficiency, reducing costs, and, not least, to improve labour quality and safety.
This work targets the problem of the implementation of a machine vision allowing tomato detection in images and, as future development, once it will be integrated with the robot, it will be really useful to perform precision farming activities: fruit classification, harvesting, local chemicals treatment etc

Methods

The overall tomatoes detection architecture is built around a method for classifying individual image regions. This is divided into two phases. The *off-line* learning phase creates a binary classifier that provides object/non-object decisions for fixed sized image regions ("windows"); while the *on-line* detection phase uses the classifier to perform a dense multi-scale scan reporting preliminary object decisions at each location of the test image. These preliminary decisions are then fused to obtain the final object detections.
In other words, the system is data-based: it learns what a tomato is and detects it on a test image through a classification method (Support Vector Machine has been used).
The performance of the method depends strongly on the dataset creation (as much bigger is the dataset as the machine vision will know about a tomato) and detector choice (which is the best representation of the tomato class?).

Expected Results

Occlusion, highlights presence, illumination variability, etc are all parameter that have to be taken into account and are still investigated in the field of computer vision. Till the moment it doesn't exist a robust method to solve the detection issues. Our approach starts directly from the object/tomato and proposes a new algorithm method in the agricultural context based on detecting classes of objects. The approach is *data-driven* and purely bottom-up using low-level visual features to detect objects.

The accuracy assessment of crop-shelter coverage classifications obtained from per-pixel methods combined with texture analyses

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Keywords: greenhouses; satellite images; object recognition

Objectives

In the field of rural areas management the environmental effects of crop-shelter coverage should be analyzed because it contributes to the modification of the environment by acting on different factors. Accurate crop-shelter coverage classification represents a basic territorial knowledge useful for the environmental management of crop shelters by local authorities.
The complexity of digital classification requires that accuracy assessment should be carried out to verify the reliability of the results.
This paper shows the outcomes of the application of some descriptive and analytical statistical techniques to analyse the representation of accuracy for crop-shelter coverage recognition obtained from image texture analyses combined with information contained in RGB-bands layers.

Methods

The imagery used in this study is composed of satellite multispectral images of the considered territory and digital images in vector format of the crop-shelter coverage obtained by visual recognition of the satellite images.
Several combination of information from RGB bands and textures were used in the classifications carried out for sample and control areas.
Error matrices were derived for each classification and some descriptive and analytical measures were computed. Other considerations regarding the accuracy assessment were devoted to factors that affect it in different ways.

Expected Results

The analysis of the accuracy assessment through the computation of accuracy measures and indices derived by the error matrix of each classification would give a more complete information on the quality of the classification results, allow comparison between different classification, and provide some hints suitable to prevent from achieving misleading results.
As regards accuracy for crop-shelter coverage classifications obtained from texture analyses combined with information contained in RGB-bands layers, the analyses reported in this study would be of importance for selecting the best combination in relation to the classification objectives.

Detecting cows at the feed barrier by means of an image analysis algorithm

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Keywords: precision livestock farming, dairy farming, vision techniques

Objectives

The automatic analysis of digital images from video recordings represents an effective alternative to traditional techniques used to study animal behaviour.
A wider research, that is actually still in progress, aims at assessing the application of an image analysis algorithm to detect the behaviour of dairy cows housed in open free-stall barns. This paper shows the preliminary outcomes of the implementation of the above mentioned image analysis algorithm for the detection of dairy cow presence at the feed barrier.

Methods

The research has been carried out in a cubicle free-stall barn for dairy cows having a row of 64 head-to-head cubicles with sand as bedding. Within the barn an area was selected where a group of 15 dairy cows was housed.
The detection model developed in this study was based on an image analysis algorithm which was originally implemented for real-time detection of human faces.
The video recordings were carried out by means of wide-angle cameras connected to a desktop personal computer through a local network. The scenes for the training, the testing and the validation of the chosen image analysis algorithm were extracted from the video recordings of one video camera placed above the feeding area providing the plan view of a region of the feeding alley.

Expected Results

Since the chosen image analysis algorithm was adapted to the problem of cow detection in a barn characterized by an open envelope, its application should produce good classification results also when significant brightness and background variations occur in the sequence of the analyzed images, as previous research demonstrated. On the one hand, this algorithm quality should make it possible to overcome the technical difficulties that would affect the image pre-processing task required to segment out cow images from the background, on the other hand it should assure the real-time execution of the classifier and, consequently, it would avoid the onerous activity of video-recording storage.

Topic 6

“Noise, Vibration, Dust, Endotoxin, Microorganism”

A novel device for assessing the health risk caused by hand-arm vibrations in olives harvesting

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Keywords: safety, MEMS accelerometers, wireless sensors

Objectives

The use of portable shakers in olives harvesting is becoming increasingly, especially in Sicily, to both to reduce the costs of production and to assure the oil quality. Nevertheless, it's well known that the use of such tools may involve risk of exposure to hand-transmitted vibration.
The aim of this study was to assess the level of exposure to hand-arm vibration of the operators using portable shakers for olives harvesting. Two different commonly used models were evaluated performing both field and laboratory tests.

Methods

Two different models of portable shaker with hook were compared (Cifarelli SC 800 and Tekna TK 650).
The tests were carried out in year 2011 both in laboratory and in the field according to ISO 5349-2 to assess the level of exposure to hand-arm vibration of the operators. The triaxial accelerometers used (Freescale MMA7455) continuously recorded accelerations in all three axes; the measured data were fed into a microcontroller and sampled via an ADC. In all the tests, the equivalent vibration total value exposures related to 8 work hours A(8) were obtained.

Expected Results

The experimental lab and field tests demonstrated the effectiveness of the research proposed in assessing workers' risks exposure during harvesting operations. The results obtained show how a simple and cheap hardware can lead to a fairly precise assessment of the risk exposure, thus providing significant information to the management in defining safe works shifts and improving the resource scheduling and allocation.

Evaluation of human exposure to vibration according to a draft Tractor Testing Method

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Keywords: concrete track, seat suspension, comfort

Aim

The evaluation of human body exposure to vibration in agricultural tractor is the purpose of the ISO 5800:2002 standard. Nonetheless, this testing method requires the use of a dedicated track, quite expensive in terms of construction and mainly in the maintenance. The DEIAGRA of the University of Bologna in collaboration with UNACOMA and CNR-IMAMOTER developed a draft testing method to assess the whole-body vibration transmitted by the seat when the tractor is travelling on a smooth concrete surface. This method is dedicated to wheeled and rubber track agricultural tractor. The purpose of the work was to verify the effect of different seat adjustments and operators on the value of Whole-Body vibration measured. The comfort and perception of the operators was also evaluated.

Methodology

Wheeled agricultural tractors were tested according to the draft testing method. During the tests, the driver seat was adjusted at different suspension levels from maximum hard response to the end-stop impact of seat suspension system. The tests were repeated with different operators. The vibration effects on operators comfort and perception were recorded. The driver seats were equipped by using a dedicated accelerometer and a linear position sensor, in order to measure the vibration magnitude and the travelling of the suspension system until the end-stop impact event. The tests were performed in a smooth concrete surface at three fourth of the maximum speed of the tractors.

Results

The vibration magnitudes measured during the tests were influenced by the mass of the operators and the adjustment of the seat suspension system. The damping effect of the seat suspension influenced the comfort of the operator in particular if the end-stop impact of suspension seat occurred.

Conclusion and Perspectives

The testing method developed by DEIAGRA, UNACOMA and CNR-IMAMOTER was not oriented to simulate the tractor operative conditions. The aim of the testing procedure basically was to characterize in a defined and reproducible condition the seat response with respect to the tractor and platform system. The test results evidenced some lacks in the draft testing method. The procedure should be improved introducing some specific adjustments of the seat and operators of different mass.
The method evaluated represents an approach toward a WB vibration measurement based on tests performed on a testing surface easy to be recovered and with a repeatable methodology.

A device for dust reduction during mechanized harvesting of hazelnuts

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Keywords: particulate matter, work hygiene, harvesting

Aim

One of the main risk factors for workers derived by the mechanized hazelnuts harvesting is the exposure to respirable dust. The harmful effects of airborne particles, which often contain chemicals used in pesticide treatments, are not to be neglected.
In the past the problem has been addressed through efforts as: use of machines equipped with cyclones; use of pick up machines instead of vacuum machines; substitution of tilled soil with grass covered ground; discharges of dust directed towards the ground rather than in the air. These interventions have not solved the problem.
Aim of the research is to develop a system to be applied directly to harvesters, who manages to give the soil adequate moisture, reducing the dust development.

Methodology

The device is based on the use of sprayers with low volume pneumatic nebulization.
Sprayers are positioned in front of the machine and along the dust exhaust pipes. A first evaluation of the effectiveness of the proposed device was performed by measuring the concentration of dust that affect the operator and that persist in the environment.

Results

The number of tests does not allow a statistical treatment of data. Given the high number of variables involved (e.g.: air speed/direction, planting distance, etc.) it does not seem reasonable to implement assessment protocols that can provide statistically acceptable regressions between, for example, hydraulic flow or number of nozzles mounted on the machine and dust concentration.
However, the first tests, conducted in the same fields and in the same days with the aim to reduce the influence of the several variables, show a decrease of dust concentration in tests with sprinklers mounted in front of harvesting apparatus of the machine (the area where dust is generated).

Conclusion and perspectives

The results can still guide the research and development of new prototypes, which can make a significant reduction in dust emission.

Main safety aspects of agricultural machinery: management of control tests on noise emitted according to EN ISO/IEC 17025:2005

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Keywords: sound pressure, sound power, quality management system, pneumatic seed drill

Aim

The aspects of functionality and safety of agricultural operating machines are being studied at CRA-ING, since about twenty years by Testing Centre of Agricultural Machinery (CPMA). According to ISO and EN standards and to comply with the provisions of the Machinery Directive 2006/42/EC, this activity includes control tests of pressure and sound power levels emitted by mounted, trailed and self-propelled machines, the values of which must be declared by the manufacturer in the user and maintenance manual. As example of CPMA test activity, this paper reports the results of tests on a pneumatic seed drill, aimed at verifying the noise emitted.

Methodology

To ensure the quality of the results obtained, CPMA has been organized as a technical-scientific laboratory, in which the management of testing activities, tools and measures takes place according to criteria of procedural severity. The resulting Quality Management System in 2010 obtained by ACCREDIA (Italian Accreditation Body), the official accreditation N° 1141 as a laboratory that operates in compliance with the severe requirements of EN ISO/IEC 17025:2005. The measurements of the sound pressure levels (according to EN ISO 4254-1:2010 and EN ISO 11201:2010) and of the sound power levels (according to EN ISO 3744:2010 and EN ISO 4254-1:2010) are among the tests accredited in such a quality system. The former are measured for frequency bands in $^1/_3$-octaves in the range 100 Hz to 10.000 Hz, as the latter are measured in 10 micro-phonic positions dislocated on an hemispheric surface. A Brüel&Kjær instrumental chain is employed, consisting of a real-time frequency analyzer, a microphone and a sound level calibrator. They periodically undergo calibration tests in an authorized centre.

Results

The test results, provided with the associated measurement uncertainty, showed a sound pressure level of 90.6 dB (A) ± 1.4 dB, above the limit of 80 dB (A) indicated by the Machinery Directive, requiring to measure of the sound power level. This resulted of 104.5 dB (A) ± 3.2 dB.

Conclusion and perspectives

Through the example of a test conducted on a pneumatic drill, this work aims to show how the CPMA laboratory works in order to provide valid, accurate and reproducible results, what is the evidence of a compliant Quality System. The objective of CPMA tests activity is the study of the safety characteristics of the machines under operative conditions, with the aim of supporting the manufacturers in the development of their products through experimental tests.

Self-propelled prototype for hazelnuts harvesting (*Corylus avellana* L.): analysis of particulate matter emitted into the atmosphere

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Keywords: particulate, pollution, harvesting machine

Aim

The paper aims to point out the characteristics of a new pick-up type harvesting machine used in hazelnuts cultivation, the dust emission in the air and the productivity of mechanized harvesting operation. The paper reports the results of a first trial in the field.

Methodology

The prototype "Semek 900", manufactured by FACMA s.r.l., uses a mechanical harvesting pick up and it was tested in a 2.0 ha cultivation of hazelnuts with a distance of 4.50 x 4.50 m between plants and the presence of grass. The fuel consumption was measured by weight system. The hazelnut fruits present on the ground had been previously moved in windrows using a hand blower. Work time measurements and analysis were conducted according to the C.I.O.S.T.A. method. Each sample of harvested hazelnut was analyzed to measure the presence of shell damages and impurities (stones, sticks, shells, etc..). The environmental monitoring of dust was carried out both in ambient air and close to the machine driver. The dust samples were analyzed for the mass concentration and chemical composition of inorganic species (elements analyzed by X-rays fluorescence and ions analyzed by ion chromatography).

Results

The average and maximum speeds of the machine were 1.42 km h^{-1} and 2.0 km h^{-1} respectively. The operative working capacity was . 0.64 ha h^{-1} corresponding to a hourly productivity of 1.25 t h^{-1}. Therefore a theoretical working capacity of 0.9 ha h^{-1} was obtained with an operating efficiency level of 71% in presence of windrows and grass. The fuel consumption was 6.8 kg h-1 corresponding to 10.6 kg ha-1. The percentage of healthy hazelnuts was 90% and the remaining 10% consists of impurities and damaged or small hazelnuts (with about 1% of cracked hazelnuts). The harvesting losses referred to the product in the windrows were 20% of the total production. The average concentration of dust was 7.5 mg m-3 in ambient air and 38.6 mg m-3 close to the machine driver. Most of the dust consisted in organics and soil components.

Conclusion and perspectives

The concentration of dust appears similar to that produced by other existing machines and therefore other solutions have to be studied.
The tests were carried out by the CRA-ING within the project FRUMED, subproject VAFRUSEME, funded by the MIPAAF.

Noise operator exposure in olive oil mills

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Keywords: Occupational disease, safety, health

Aim

Noise in work environment is among the major causes of concern for safety and health of the industrial workers, as it causes annoyance and hearing loss. As with most occupational diseases, recognition and assessment of noise exposure are the foundations on which preventive measures and treatments are based. Aim of this study was to identify the predominant noise sources in the workrooms of two small olive oil mills in the South-East of Sicily and to measure the extent of noise exposure of the workers.

Methodology

Measurements of the sound pressure levels were carried out in two olive oil mills, different for plant layout and grinding process: the former by means of a traditional millstone, the latter by using a steel hammer-type crusher. Measurements were carried out at operator's ear level in the working zone, near the machines (first mill) or on a rectangular grid (second mill). Noise signals were recorded by using a PC-based measuring system and then post-processed according to the Italian Decree 81/08.

Results

The results, still under examination, showed quite high sound pressure levels, especially in the second mill (average of 93.6 dB(A)). In the first mill, sound pressure levels ranged from 75.2 to 94.4 dB(A), depending from the machines running contemporarily. The main sources of noise were the defoliating and the washing machine in both mills, as well as the steel hammer-type crusher in the second mill.

Conclusion and Perspectives

These first results show that sound pressure levels in olive oil mills are quite high. The daily limit value of 87 dB(A) reported in the Italian Decree 81/08 is currently exceeded, taking also into account that, during the oil campaign, operators work more than 8 hour a day. Even if the oil campaign lasts 3–4 months a year, the regular use of personal protective equipment should be imposed among the operators in order to prevent future troubles noise-related.

Vibration operator exposure during olive harvesting

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Keywords: Safety, Electric shakers, Hand-harm system

Aim

Trunk shakers are the reference for harvesting intensive olive groves, but also handheld vibrating machines can increase the work capacity with respect to the manual harvest. Vibration is probably the most important risk connected with the use of these portable harvesters, so the development of new models has involved changes in power source, shape and dynamics of the harvesting system, as well as in the material for their construction. This research aims to evaluate the vibrations transmitted to the hand-arm system when using handheld electric shakers at varying diameter and material of the bar and operating conditions.

Methodology

The paper reports the results of measurements of vibrations transmitted to the hand-harm system by an electric shaker for olive harvesting during both laboratory and in field tests. To assess the effects of diameter and material of the bar, one flap type olive harvester was applied to three bars, different for diameter (35 and 40 mm) and material (aluminium and carbon fibre). Laboratory tests were aimed at evaluating the operator vibration exposure in standard controlled conditions. Successively, the measurements were replicated in field during the harvesting of "Nocellara Etnea" olive variety in ordinary working conditions to assess the effects of the tree canopy with respect to the idle running.

Results

The results of the laboratory tests showed that the bar material has the greatest influence in reducing the vibration global value: the average RMS value was about 12 m/s^2 for the carbon fibre bar and about 21 m/s^2 for the aluminium ones, without significant differences between the two diameters. The in field tests proved that the tree canopy had on average a negative effect on the vibration transmitted to the hand-arm system: in fact, the average RMS value increased from 16 (laboratory) up to 20 m/s^2 (in field).

Conclusion and Perspectives

Global accelerations are quite high (about 20 m/s^2) and comparable with those measured when using mechanic or pneumatic machines, so the vibration level is mainly affected by the kinematic system rather than the power source. Therefore, operators should take responsibility for occupational health and safety and take safety precautions to reduce continuous vibration exposures. Other experimentation needs to assess the effect of different harvesting heads.

The heat stress for workers during vegetable grafting in greenhouses

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Keywords: microclimate, work hygiene, controlled environments

Aim

The use of grafted plants on resistant genotypes is now widely widespread in the Mediterranean horticulture. Plants with greater resistance to infections by soil-borne pathogens and increased tolerance against abiotic stresses are obtained by the different grafting techniques. The vegetable grafting is carried out in controlled environments, the most used are greenhouses, in order to adjust the main climatic factors that affect the healing: temperature, relative humidity and solar radiation. The values of air temperature recommended in literature for the healing are at least 23÷25°C although some authors indicate higher values, the relative humidity must be close to 95% and shade cloths must be used to reduce the radiation on plants. The total automation of grafting operations is difficult due to no perfect uniformity of the plant but some phases of the grafting can be automated to increase labor productivity. In this context, the presence of the operator cannot be eliminated and he is subject to heat stress beyond make over repetitive tasks. The aim of this study is to assess the heat stress for workers employed in Mediterranean greenhouses for vegetable grafting.

Methodology

In a farm, located in the north coast of the Lazio Region, climate data were recorded in a greenhouse used for vegetable grafting (tomato, watermelon, melon) for the period from September 2010 to June 2011 and the main indices used for heat stress (WBGT, PMV and PPD under the law, ESI as alternative to WBGT) were calculated.

Results

The results show a marked overcome of critical thresholds by all the indices in the months of May and June, but in April the thresholds are exceeded even if for short periods.

Conclusion and perspectives

In order to mitigate the conditions of heat stress we can take different measures: a more accurate control of higher temperatures in confined environment (ventilation, cooling), a better choice of clothing workers and a reduction in time of exposure to high temperatures.

Prediction of whole body vibration through a multibody model of a tractor seat

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Keywords: safety, acceleration, damper

Objectives

The vibrations transmitted to the driver induce permanent and temporary damage to the body. The agricultural tractors are characterized by a vibration level that can be higher than the exposition level fixed by the 2002/44/EC, in some conditions. The vibrations on tractors have a high intensity and a low frequency with the consequence of difficulties in the project of suspension systems able to reduce the intensity of the level. The numerous innovative suspension systems studied in the recent years, as the active and semi-active seats, did not introduce significant improvements.
In the present paper a multibody model of a seat suspension system to an agricultural tractor with a 170 kW power, has been defined with the goal to predict the seat acceleration and evaluate the reduction of the vibration level transmitted to the driver.

Methods

The tractor has been fitted with transducers able to measure the roll, the pitch and the acceleration level on the three axles, also the acceleration on the seat has been measured. During the driving on the road the vibration levels have been measured in different conditions. The geometry of the seat has been defined and a multibody model has been designed using an analytical model of the air spring and the oil dumper. Finally through an optimization routine the seat suspension parameters have been defined.

Expected Results

The model is able to reproduce the seat acceleration with different spring types (air springs or oil dampers) changing only some parameters of the model. This model can be easily used by the tractor designer and integrated in the multibody models of the whole tractor to optimize the behavior of the seat suspension. Finally, the model could allow to design new types of dumpers able to reduce the whole body vibrations.

Risk assessment due to transmission of vibrations from olive electrical and pneumatic harvesters to the Hand-Arm System (HAV): definition and evaluation of levels and exposure time

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Keywords: vibrations, agriculture, health and safety

Aim

Every day farmers are exposed to health and safety risks, due to work environment and the machineries they use. This study is focused on exposure to vibration during the olive harvester for farmers of Azienda Agraria Didattico-Sperimentale of Università Politecnica delle Marche. The present research aims to highlight the importance of the exposure to vibrations in agriculture and its consequences on human health, above all the risks for the hand-arm system during the working day.

Methods

To assess the exposure to mechanical vibration transmitted to operators during the olive harvest in the different operating conditions, measurements are done using a vibration measuring equipment. The measures are performed by fixing the accelerometer at different heights of telescopic rods of electric and pneumatic harvesters.
The tests have been carried out during the regular working activity.

Results

The vibration samplings were carried out on electric and pneumatic harvesters. The measured data are compared with the prevention values for the safety requirements fixed by the normative. To make the employers able to organize adequate work schemes, respecting the health of the worker, the maximum daily duration of exposure for each olive harvesters has been calculated. The analysis of the results shows that the electric harvesters transmit vibrations equivalent and in some cases superior to those provided by the pneumatic harvesters. The pneumatic harvesters having the motor at the top of the pole show higher vibration levels at the top or middle of the pole where the vibrations are the sum of the motor, the movement of the comb and bumps against the branches. Instead in the electric harvesters the motor is positioned at the bottom of the pole where the handle is positioned.

Conclusion and Perspectives

The present research, evaluating the risk to the hand-arm system due to vibrations, give an overview of the exposure of workers to the risks arising from vibrations to which operators are exposed when using olive harvesters.

Risk due to noise during the olive harvest: the electrical and pneumatic harvesters

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Keywords: agriculture, safety

Aim

The review of trends in farm practices and machinery development suggests that noise problems are still prevalent in agricultural situations, even though there has been a steady increase in the availability of materials and equipment for noise control over recent years.
The aim of this study is to assess the noise exposure for workers during the olive harvest in Azienda Agraria Didattico-Sperimentale of Università Politecnica delle Marche. A monitoring of noise levels is conducted in some days of the years 2010-2011.

Methods

The noise samplings were carried out on electric and pneumatic harvesters.
For the sound pressure measurement a sound level meter (Brüel & Kjær type 2250) and a microphone was used. The sound level meter can measure the noise dose to which a person is exposed in a given period of time. Dose means the sound level limit ('A' weighted) at which a worker may be exposed during an eight hours working day, without the risk of hearing loss.
The tests have been carried out during the regular working activity.

Results

The results allowed to evaluation the noise exposure during the olive harvest. Every machine has been directly analyzed to establish the level of noise produced according to the laws in force. With the collected data it was possible to establish the maximum exposure times for every instrument. The measured data respect the D.Lgs.81/2008 on the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (noise).

Conclusion and Perspectives

The comparison of all measured values for the harvesters examined shows respect to the limitations in D.Lgs.81/2008. In the future the aim of the research will be study the reduction of the noise levels on an olive harvester and define possible interventions with low technical and economic impacts to be made to the harvester model examined for the reduction of the noise.

Improving vibration comfort on modern crawler tractors

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Keywords: comfort, seat suspension, silent-blocks

Introduction

On modern agricultural tractors, many means have been recently introduced to improve the vibration comfort. Apart the driver's seat, equipped with a passive pneumatic (or sometime with an active electronically controlled) suspension, new device have been recently fitted, being them the cab/floor pneumatic and the front axle hydraulic suspensions.
Nevertheless, these means have been applied systematically only on new high-power wheeled tractor models; the other medium- and low-power wheeled tractors only partially were equipped with the cab and/or the front axle suspensions, being in any case the performance of the seats sufficiently good.
The situation on agricultural tracklaying tractors is unfortunately not so good: no cab or front axle suspension are at the moment provided, and sometimes also on new tractor models no or a poor seat suspension is fitted; as a consequence, the vibration levels measured on board of tracklaying tractors often widely exceed the limit provided by the Standards.

Methods

The tracklaying tractor manufacturers are engaged to improve the comfort level, trying to reduce as the vibration generation (in particular those produced in the low frequency spectrum, caused by the travelling of the tractor on hard surface), as the vibration transmission, by applying silent-blocks between the tractor body and the floor and by improving the seat suspension quality.
The vibration levels at the driver's place of a group of tracklaying tractors produced by some leading manufacturers have been recorded, differing the models examined for the track support rollers number, the seat suspension type and stiffness and the coupling of a hitched implement.

Results

The seat suspension type and above all its correct adjustment (in relation to the driver's mass) influence remarkably the vibration level. Similarly, the increase of the track roller support number (from 5 to 6) improved the situation, probably due to a better stability of the machine, especially when travelling at high speed on hard surface. On the contrary, an implement coupled at the rear 3-point linkage does not change remarkably the vibration comfort during transport, because the mass distribution of the tracklaying tractor does not result significantly affected.

Safety at the workplace in the grafted cuttings production: first results of a study in Friuli-Venezia Giulia (North East of Italy)

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Keywords: risk analysis, grafts, safety management

Objectives

The grafted cuttings production in Friuli-Venezia Giulia (North East of Italy) represents a compartment of strong importance in the agricultural scenery.
The production is in fact exported in 32 countries of the whole world.
Despite the great attention on safety at the workplace, very little information is available concerning safety levels in this particular sector.
So, the present work wants to evaluate the situation of safety at the workplace in a sample of 15 firms, analyzing the fulfilment of formalities required by Italian law and the safety management, in order to have a starting point for further and contemplated studies related to this theme and to study practical solutions for a better management of safety.

Methods

The research was carried out during 2011 in a sample of 15 firms belonging to the studied sector of Friuli-Venezia Giulia and was divided into three steps.
The first step consisted of the selection of the sample; the second step led up to the creation of a check list. During the third step we carried out the survey on the sampling and we elaborated the collected data.

Expected Results

First results show some critical point concerning the requirement established by law, while good levels of safety management are recorded in the most part of firms. Starting from these results, this search wants finally propose some practical tool for a better management of safety levels, with particular attention to the interference risk (present in agriculture, but little studied) and to the training of workers. Looking ahead, the work wants to export to all firms of this sector an integrated system of safety management, able to improve the operational conditions and to simplify the management of formal requirements.

Analysis of the influence of different typologies of tires on the whole body vibration exposure of an industrial truck operator

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Keywords: safety, comfort, solicitation

Objectives

Purpose of the tests, of experimental kind, was to measure the exposure to whole body vibration of an operator of an industrial truck fitted with different tires.
In the use of these vehicle there are three main sources of vibration for the operator: the operation of displacement, of power lifting and the engine.
Only the displacement has significance values of whole body vibrations.
Following this aim in agree with the Customer and the adopted standard only this employment has been tested.
Beside, during working an operator is subjected to all the described operations and with different requirements of time, consequently the results won't be representative of the daily exposure to vibration of an operator, that will result lower, but will allow to evaluate and compare the usual component of an industrial truck. The adopted standard for the tests was the EN 13059:2002+A1:2008 (E).

Methods

An industrial truck fitted with six different tires has been tested in two conditions of load and in three conditions of forward speed. The accelerations have been measured at the three axis at the cushion of the seat and at the vertical axis at the frame of the vehicle at the base of the seat. Comfort test have been carried out on the track of concrete of the CRA-ING of Treviglio. Two artificial bumps were superposed on the surface as specified in the standard. Test track specifications were: 25 m length of the stretch of the test; 8 mm height and 150 mm length the dimensions of the obstacles; 10 m the obstacles' distance.

Expected Results

The values of the accelerations resulted from 0.6 $m \cdot s^{-2}$ to 2.3 $m \cdot s^{-2}$ covering all the range between comfortable and uncomfortable depending from test setting.
The level of solicitation increases with the increasing of the speed also if not in a linear fashion.
The adoption of the ballast levels the values of exposure in all the tested conditions.
The exposure's value at the frame resulted, generally higher than at the seat.
The variable tire resulted not significant in the values at the frame. It resulted, instead, influencing the values at the seat.

Transmissibility of agricultural tractors seats

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Keywords: CEE 78/674, ISO 5008, WBV

Objectives

Vibration transmissibility to driver's body of agricultural tractors operators is largely related to the seat installed over the tractor.
Tractor seats are laboratory certified following specified standard, as the CEE 78/764; this standard requires that the vertical transmissibility only (Z axis) is verified. Nothing is required for vibration transmitted along the longitudinal (X axis) and transversal (Y axis) directions.
The aim of this work is to evaluate the efficiency of tractor seats in terms of whole body vibration reduction to drivers, along three directions, on field measurements.

Methods

An agricultural tractor with a pneumatic suspension seat has been used, analyzing its vibration behavior in many field tests conditions. Different paths have been considered: harrowed clay, grass, asphalt, farm road and artificial test track (ISO 5008). Tests have been moreover carried out both with the unballast (3930 kg) and the same ballast tractor (4760 kg). Different forward speeds have been analyzed in each test upon described. Two triaxial accelerometers have been used: the first has been fixed on the platform, close to the seat. The second has been put on the seat surface.
The acceleration measurements were repeated three times to obtain reliable seat evaluation.
Seat transmissibility in each field test conditions were assessed considering frequency range defined by risk assessment directive ISO 2631 about whole body vibration exposure.

Expected Results

The whole obtained results have demonstrated that the seat transmissibility is low along the vertical Z direction in all the operative conditions, independently from the tractor forward speed. Along the transversal (Y) and longitudinal (X) direction the transmissibility is instead always bigger than one. Higher transmissibility values (1.3) are obtained along the X direction when the ballast tractor works on the harrowed clay.

Inhalable dust emission in hazelnuts mechanical harvesting (Corylus avellana L.): test of a low impact suction-type pneumatic collector

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Keywords: particulate matter, pollution, hazelnut harvesting

Aim

The paper will point out the possibility of reducing easily the quantity of inhalable dust emitted into the atmosphere during hazelnuts mechanical harvesting by the use of an innovative device, installed on a self-propelled suction-type pneumatic collector. The paper reports the results of preliminary tests carried out in Italy.

Methodology

The tests of hazelnuts mechanical harvesting were prepared using two self-propelled suction-type pneumatic collectors having the same technical characteristics; only one of these was equipped with a new electro-hydraulic device, designed in order to facilitate the reducing of inhalable dust emitted into the atmosphere. The device has been developed in IRCARN project (Interventions for the Reduce of Airborne concentration while the hazelnuts mechanized harvest, funded by MIPAAF) by the DAFNE Department of Tuscia University. The effectiveness was measured both in ambient air and close to the machine driver. The dust samples were analyzed for the mass concentration and chemical composition of inorganic species (elements analyzed by X-rays fluorescence and ions analyzed by ion chromatography).

Results

The results showed that the dust concentration significantly decreases when the new device has been used; the reduction of dust emission has exceeded 70% in environmental sampling and 60% in personal sampling, in comparison with the other machine without the device. The chemical analysis of the sampled particulates revealed the presence of soil components and small amounts of ionic species. The remaining fraction is to be attributed to organic species.

Conclusion and perspectives

Since a satisfactory general dust reduction has been obtained, it is expected that further research will be conducted including the determination of the level of free crystalline silica (SLC) in the areosol, which can be a high risk factor both for the operators and for the bystanders. The tests were carried out by the Agricultural Engineering Research Unit (CRA-ING) of Agricultural Research Council within the project FRUMED, subproject VAFRUSEME, funded by the MIPAAF.

Vibration transmitted to operator's hands by a new type of rotary pick-up for the harvest of table olives

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Objectives

Ninety percent of the world's olive trees are located in the Mediterranean basin and Spain leads global production with the 35% of the table olives; Italy, Greece and Turkey follow as the other major producers. Fruit removal is the main aim of vibratory fruit-harvesting machines used on fruit-bearing trees. The harvesting methods vary and depend on different factors such as fruit species, characteristics, tree size and the grower's economic situation. A new type of rotary table olive hand harvesters has been studied. This work has two aims. The first objective is to determine and evaluate vibration transmitted to operator's hand. The second one is to evaluate the combination, in terms of the best performance, of the machines used for mechanized harvesting of table olives. Several factors have been examinated: undulating teeth variation thickness, different rotational speed and different coating material used to reduce the impact damage on olives.

Methods

In order to reduce the probability of impact damage, three different coatings for undulating teeth have been realized with a thickness of 3, 14 and 19 mm. Furthermore, three different types of plastic materials have been used for each thickness: silicon vulcanized rubber and natural rubber . Ultimately, the coated undulating teeth have been tested at three different rotation velocity: 2000, 3000 and 4000 rpm. For each machine combination the operator's exposure to hand-arm vibration has been evaluated using the method defined in ISO 5349-1:2001 and detailed practical guidance on using the method for measurement of vibration at the workplace.

Expected Results

The work has shown that it is possible to reduce the damage on the harvested fruits. The thesis, that used natural rubber or silicon with 3 and 14 mm thicknesses and with velocity between 2000 and 4000 rpm, show a percentage of intact fruits between 65% and 67%, significantly higher than that of the fruits harvested by undulating teeth coated with vulcanized rubber. Based on results, it is evident that the vibration level (acceleration-rms) transmitted from the three different thesis to the operator's hands are different at the three level of speed used for the harvesting. It is presumed that vibration hazards are reduced when
continuous vibration exposures over long periods are avoided.

Comparison of noise level of tractors with cab and without

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Keywords: Noise, tractors, cabin

Objectives

"Noise" or "unwanted sound" is one of the major sources of discomfort to the workers which affects human both psychologically and physically. Tractor operator comfort is affected by how much noise of tractor produces during continuous operation. Noise at work in agriculture or horticulture can cause hearing loss.

Methods

A tractor without cabin and one with cabin (closed window and open window) loaded with mounted moldboard plow and disk harrow were tested for noise level in different gears at the driver's ear and bystander ear. The permissible exposure time for safe hearing effect was calculated. The sound level trend versus gears was also shown.

Expected Results

Results showed that the Sound Pressure Level (SPL) at the driver ear for the tractor without cab in all gears ranging from a low of 91 dB(A) to a high of 93 dB(A) were more than NIOSH allowable 85 dB(A) criteria for eight hour of operation. All domestically manufactured in Iran are without cabin. The SPL of the tractor with open windows cab with a range of 86 to 88 dB(A) was also higher than the standards but lower than that for the tractor without cab. Loading with moldboard and disk did show significant effect at Hi 1 gear for no cabin and open window cabin. The SPL for closed cabin in all cases stayed below 82 dB(A). It was concluded that the driver should either stay on driving for less than 2 hours with tractors without cabin and open window cabin or the only best way, the tractors should be equipped with factory made cabins.

First surveys on chainsaw operators' hard wood dust and exhaust gases exposure: a Tuscan project

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Keywords: wood dust, chainsawer safety, exhaust gases

Objectives

In 2010 the Tuscany Region promoted a research project on the evaluation of the forest operators' hard wood dust and exhausts gases exposure in chainsaw cutting operation and in chipping operation, using a standardized survey methodology.
The primary aim of this project is to correlate the chainsaw working time with the dust polluting amounts measured in different forest sites and working operations (coppice clear cut, softwood thinnings or sanitary cut) and to highlight the operational aspects and the operator behaviours that may maximize the exposure to the polluting agents.

Methods

The mass concentration of respirable particles and total dust at the workplace was determined by the method of personal collectors (Button Sampler, Iom plus Xad, Radiello) connected to different air pumps. The surveys were focused on the collection of: the hard wood dusts, the polycyclic aromatic hydrocarbons (PAHs) and the values of benzene, toluene, etilbenzene and xilene present in the exhaust gases.

Results

One of the most important result is the reduction of the polluting agents concentration measured by personal collectors using the special fuels (alkylate petrol) for chainsaws in comparison to the normal fuels usually adopted.

Conclusion and Perspectives

Concerning the hard wood dusts concentration analysis in processing fuelwood and in softwood thinnings different results were observed. In coppice clearcut or in softwood pruning concentrations were quite similar to the limit values of 5 mg/m³, allowed by the European Union. At the same time an high influence of the survey season (winter or summer), the operators' working methods and the tree species was also highlighted.

Topic 7

“Occupational Health”

Work related stress in horticultural nursery: risk assessment and identification of the preventive measures

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Keywords: work safety, management standards

Objectives

The horticultural nursery crops are today done in large farms with structures, equipments, machines, heavy work cycle and organization that can cause work related stress. The research has set out to assess the risk of work related stress under the italian Legislative Decree 81/2008 and provide parameters to activate a project of prevention and promotion of well being at work in this area. The work was carried out in a Tuscany greenhouse nursery that carries out its activities on an area of more than five hectares.

Methods

The stress assessment methodology followed the procedures mentioned in the manual INAIL (National Institute for Insurance against Accidents at Work - ed.2011) by use of companies and the guidelines of the Tuscany Region. After the identification of homogeneous groups of workers the methodology have included two types of evaluation, a preliminary and a detailed one.

- Preliminary Evaluation carried out with checklists of the following indicators:
  1. Sentinel events (accidents, absenteeism, turnover, medicals, etc.)
  2. Work area content (environment, microclimate, equipment, workload, working hours, etc.)
  3. Work area context (roles, careers, independence, relationships, interfaces, etc.)

At the end of the preliminary evaluation it was determined the level of risk for the homogeneous groups of workers; in the case of groups with high level of risk we proceeded to the next detailed evaluation of the subjective perception of risk.

- Detailed Evaluation conducted by questionnaires and next Focus Groups.

Expected Results

1. Directions about quality and efficacy of the procedures issued by INAIL and Tuscany Region applied to the horticultural nursery area.
2. Development of specific communication strategies for employees involvement.
3. Identification of the action plan containing measures to eliminate or reduce exposure to risk from work-related stress.
4. Find useful indications in the planning of future preventive actions.

Analysis of accidents with self-propelled agricultural machines from 2008 to 2010 in Austria

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Keywords: accident, protection, farm machinery, injuries, database analysis

Objectives

The increased levels of mechanizations and time and cost pressures are main reasons for serious accidents in agriculture. In addition, large tractors and self-propelling harvest machines for load transportation are more intensively used in agriculture. The main objective is to analyse recognized accidents of these machines and to identify accident reasons, information and safety gaps. Prevention measures, acts and technology-based solutions, especially to close safety gaps on constructive and ICT-based level should be found out, based on these results or of further studies.

Methods

A database with all approved occupational accidents with tractors, self-propelled agricultural machines and with load carrying machines from 2008 to 2010 in Austria was investigated. The evaluation results were shown with crosstabs and their dependences were checked by chi-square-tests. A literature and internet research was used for discussion and verification of the found out results.

Results

The analysis of the database showed that 785 approved occupational accidents with tractors, self-propelled agricultural machines and with load carrying machines occurred from 2008 to 2010 in Austria. More than 40% of the accidents happened during driving the vehicle due to a loss of control. The biggest share of the accidents took place on fields, grasslands and on the yard area. The majority of the victims were male, Austrian citizen and at the age of 41 to 50. Accidents with tractors, self-propelled agricultural machinery and transportation industries had similarities. Causes, processes, and effects were similar in certain cases. Therefore, certain preventive measures can be applied to all categories. Additionally, special measures are needed for each category to achieve a high safety status.

Use of sunscreen as protective personal equipment (PPE) in a population of Italian gardeners

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Aim

High levels of exposure to ultraviolet (UV) radiation increase the risk of all three common forms of skin cancer, and approximately 65%-90% of melanomas are caused by exposure to UV radiation. Behaviours that can reduce skin cancer risk are wearing protective clothing; or using appropriate sunscreen protection.In Italy the incidence in period 1998-2002 of non melanoma skin cancer is 87,2/100000 in male and of 54,2 /100000 in female, with a report of 6411 new cases every years. Gardeners as others agricultural workers spend the mayor part of their working time during spring and summer outside exposed to sun rays.

Methodology

We started a study evaluating the possibility of using sunscreen as protective personal equipment (PPE) in a population of gardeners. We enrolled a group of gardeners of a small Italian company, in which use of shirt during spring and summer is mandatory by company policy. Sunscreen used is Erifotonae cream containing pholitiasis that in 2009 received the European approval in using in prevention of attinic Keratosis and non melanoma skin cancers.
The study was divided in 3 phases, first an information to all the workers about UV protection, than we give free samples of cream, and at the end a dermatological screening.

Results

We enrolled 32 workers (1 female and 31 males). 26 agreed to try in using cream and 15 of them for all the three summer months of test. Workers that stopped in using cream almost referred problems during activity of major swelling. We recovery also an allergic reaction in a subject that report previous dermatological problems in sunscreen use. Stratifying workers by photo type 4,2% belongs to type1, 20,8% to type2 and respectively 62,5% and 12,5% to type3 and 4. The adherence to the program decrease from 100% of type1 to 50% of type3 and 4 workers. We found differences between who use or don't use the cream in Work Ability Index (WAI) with a mean of 42,8 in uses versus 41,2 in don't users ; no differences were found in age or scholarship between the two groups.

Conclusions and Perspectives

Our data suggest that the chance of using sunscreen as PPE is not refused by workers but is important to improve the absorption of cream especially in activity that cause consistent swelling. Extend the intervention in other companies expanding the populations tested will give more data about the compliance of sunscreen use as PPE.

Immunomodulatory effects of alpha-cypermethrin on cytokine production in greenhouse workers

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Keywords: pyrethroid, interleukin, 3-phenoxybenzoic acid

Objectives

Cypermethrin (CYP) belongs to type II synthetic pyrethroid insecticides and is widely utilized for agricultural and environmental applied.
Synthetic pyrethroids are neurotoxins: they affect axons of the neurons of the peripheral and central nervous system.
Pyrethroids, and particularly CYP, induced cytotoxic and genotoxic effects both singularly and in synergy with other pesticides and/or contaminants.
Aim of the present study was to evaluate the effects of Alpha-cypermethrin (α-CYP) on plasma levels of IL-1β, IL-2, IL-4, IL-5, IL-6, IL-8, IL-10, IL-12p70, TNF-α, TNF-β and interferon-γ (INF-γ) from occupationally exposed greenhouse workers (GhW). Urinary levels of 3-phenoxybenzoic acid (3-PBA), a metabolite of Alpha-CYP, were also determined.

Methods

The study population consisted of 30 GhW specialized in pesticide spraying who worked for companies located in the Ragusa province of Sicily and 30 control, office workers. GhW typically manipulate various pesticides (mostly pyrethroids) throughout the year, depending on the season and on cultivation type in the greenhouse. GhW were exposed to α-CYP during the mixing, loading and spraying of insecticides and during the cleaning of the nozzles, servicing of the devices and reentry to treated areas

Results

Urinary 3-PBA levels in GhW were significantly ($p<0,01$) higher than control. In fact, the mean urinary 3-PBA level in GhW was 7.8 ±2.1 μg/g creatinine; while the concentration of 3-PBA in control group was always below the LOD.
The mean plasma IL-1β, IL-4, IL-5, IL-6, IL-10, IL-12p70, TNF-α and TNF-β levels were not significantly different between the two groups of workers in the study. Mean plasma INF-γ and IL-8 levels were significantly ($p<0,05$) different between GhW and control group; mean plasma IL-2 level was more significantly ($p<0.001$) higher in GhW than control. No correlation was found between urinary 3-PBA levels of GhW and plasma levels of cytokines detected.

Horticultural Therapy for Burnout Patients at Farms

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Keywords: mental health, rehabilitation, farm work, nature

Aim

The number of people who are suffering anxiety disorders, depression or burnout are reaching a new peak. The risk to get a temporary incapacity to work caused by a mental disorder lies by about 25 percent for the average European (vs. European Commission 2008, BKK 2008). Burnout is not a disease but a syndrome and there consists no standardized or approved way to treat people who are in need. For several hundreds of years, horticultural therapy is known for an alternate way to rehabilitate people with physical disabilities and a proper method to treat mental diseases and diseases caused by psychological disorders.

Methodology

The current procedures to treat burnout patients are residential treatments in a secure environment and/or supervised medicamentous treatments at home in the best case and absolutely no treatment in the worst case. A new kind of therapy for burnout patients would be a treatment based on "Farm for Schools". This way of therapy combines individual and group therapy, ergotherapy and physiotherapy. Apart from that, patients benefit from fresh air, nature and the general effect of "green", the natural color of plants of course.

Results

There exists no standardized and sustainable treatment for burnout patients in Austria and horticultural therapeutic treatment is not designated for burnout. There are no forecasts, if this type of therapy achieves high success rates or not. Well known is in this context, that horticultural therapy reduces the general stress level and the blood pressure, which helps to prevent cardiovascular diseases.

Conclusion and Perspectives

As every 4th average European is suffering a mental disorder, at least once in his life, the health care system has to react to the increasing need of treatments and rehabilitations. This increased necessity needs to have a well-functioning health care system, which is not given in every European nation. Horticultural therapy is an inexpensive way of treatment and is affordable for health insurance companies and for private patients. To proactively antagonize burnout, it needs a rethink from company leaders that horticultural therapy should be accessible for each employee. The sessions, for example, could be held at green areas like an employee garden or a greenhouse with a cafeteria located inside.

Health and safety aspects during pesticide application in iranian rice growers'

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Keywords: Iran, acute poisoning, applicator safety

Objectives

Due to generally simple-to-use, fast-acting, and effective attributes to manage the majority of pest problems, Chemical pesticides, have a key role in agricultural production systems. These products were made to alter life cycles of living pest organisms and improper handling of them is dangerous to involved people. However, acute poisoning during spraying operation is an important health problem among farm workers and operators, but there is a substantial lack of data and studies from Iran to investigate unsafe acts and conditions, poisoning frequencies and factors could be effective in fostering pesticide application safety.

Methods

Data were collected on 110 rice farm households using surveys and field experiments in Fars Province of southern Iran. Based on WHO possible acute pesticide poisoning definition, the acute poisoning prevalence and unsafe acts and conditions affecting it were investigated. A composite indicator, translating unsafe acts and conditions into score was developed. The correlation between composite unsafe indicator and acute poisoning were examined. Chi-square test also was performed to assess the association of acute pesticide poisoning with pesticide applicator characteristics and unsafe acts and conditions.

Results

This study revealed that 12.7% of pesticide applicators suffered acute pesticide poisoning. The results showed rice farmer acute poisonings can be traced to unsafe practices in handling pesticide. Safety knowledge, personal protective clothing, gloves and boots worn in the field and equipment malfunction had statistically significant effects on acute poisoning. The results also showed expired, banned and illegally imported pesticides were utilized in large scale. This unreasonable utilization not only increases health risks but also reduces chemical effectiveness.

Conclusion

This study suggests that pesticide safety education and use of protective application methods could be effective in reducing the risk of acute pesticide poisoning. Safety training on proper and safe pesticide handling could minimize chemicals risk factors. Different effective training modes, preferably, oral presentations and storytelling programs should be developed and enforced. In addition to safety training, improving maintenace and repairment status of spraying equipments, preparing and distibuting compelete packages of personal protective appliances among pesticide applicators. is necessary. Health and safety aspects of applicator family should be also focused.

Safety aspects in the utilization of agricultural tractors

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Keywords: maintenance, control, driver safety

Aim

The Italian legislative decree of April 9, 2008, No 81 and subsequent amendments established a series of obligations for the employer (Article 71) and the self-employed (Article 21), that request, among other things, the implementation of measures ensuring that work equipment is properly maintained, in order to ensure the continuity of the safety requirements of Article 70 and the correct keeping and update of the audit log. The purpose of this paper is to provide organizational solutions and/or procedures capable to support the industry (employers and self-employed) in the verification and maintenance of safety requirements for agricultural or forestry tractors intended as work equipments, in accordance with the requirements of article 71, paragraph 4, letter a) point 2 and letter b) of Legislative Decree no. 81/08.

Methodology

27 agricultural tractors, different per class of power, mass and type of propulsion (22 wheeled and 5 tracked tractors), have been examined. Through a series of detailed and targeted inspections, the main shortages and non-compliances have been identified. Then, a plan for the adjustment and the correct management of the machines has been activated with the aim of raising the level of safety during the work and of protecting the physical integrity and the health of the workers. During the inspections, checklists have been adopted, derived from technical standards normally used in the production process of new tractors, referring to the main tractor components. The checklists regarded the following topics: technical data of the tractor and user manual; presence of pictograms; access to the driver seat; control console; lighting and signaling devices; rear-view mirror; propulsion units and support services, protection devices in case of overturning; driver's seat and seatbelt system; protection from moving and hot components; electrical equipment; hoses and hydraulic couplings. These arguments should not be considered exhaustive of all the safety requirements required by law.

Results and Conclusions

The first results of the audits show that 15% of the inspected tractors lacks a protective device in case of overturning. As to the driver's seat, 29% is in excellent conditions, 15% is sufficiently preserved, while the remaining 56% is in poor conditions. 74% of the seats has no seatbelt. As regards the protections from mobile and hot elements, 41% of tractors has no guard against accidental contacts with the fan belt and with a large part of the engine compartment, on both sides.

Topic 8

“Environment Safety and People Health Protection and Welfare”

Foliar application of nematodes for noctuid moths control in spinach with traditional boom sprayer

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Keywords: application technique, biological control, environmental health

Objectives

In Europe, Italy is the largest producer of spinach for industrial use (FAO 2009). Among the major insect pests in this crop, noctuid moths are considered the most important (Lanzoni and Burgio 2010). The control of these pests can take advantage of biological organism application in relation to the reduction of pesticide formulations availability, the selection of resistance to chemicals, and the respect of latency period. This study reports the results of mechanical application of the nematode *S. carpocapsae* with conventional hydraulic equipment for the control of noctuid moths in processing spinach in open field.

Methods

Laboratory tests have been performed in order to exclude the possible reduction of viability of the nematode due to physical stress induced by the passage through the equipment. Particularly the effect of static pressure, passage through the nozzles and recirculation effect were considered. In a field trial applications of EPN alone and in a mixture with *Bacillus thuringiensis* Berliner (Bt) were carried out employing a conventional sprayer. The efficacy of control against noctuid moths in spinach was evaluated. Moreover the biopesticide action was compared with conventional chemical control.

Results

Results showed no variation in nematode viability related to physical stresses (static pressure, passage through the nozzles, remixing effect). In the field trial, treatment with EPN alone and with the mixture EPN+Bt showed no significant differences with respect to the control. Nevertheless, in general these treatments were not significantly different from chemicals. The combined application of EPN and Bt showed an additive interaction compared to EPN alone.

Conclusion and Perspectives

The application technology and EPNs formulations availability make nematode applications feasible against some foliar pests.
The low pest control efficacy of EPNs alone or mixed with B. thuringiensis against noctuid moths can be attributed to environmental factors as temperature, desiccation, and the high rainfall occurred during trials.

Management of pesticide distribution remnants in italian glasshouses and vineyards

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Keywords: water, pollution, PPP applicaton

Objectives

Correct management of pesticide contaminated wastes is a key point in order to prevent environmental pollution and is more and more considered in the ambit of legislative measures dealing with pesticide application (e.g. EU Directive on Sustainable Use of Pesticides, EC 128/2009). Either the spray mixture left over or the empty plant protection products (PPP) cans have to be managed in a proper way avoiding contamination risks for the operators as well as for the environment. Point sources, in fact, are typically generated by the not proper management of pesticide wastes (residues of spray mixture, sprayer washings, PPP empty cans, etc.).

Methods

With the aim to collect some information about the actual procedures adopted by farmers in Italy concerning the management of pesticide distribution remnants, three surveys were conducted. The first one involved 160 glasshouse farms located in Liguria region (North Western Italy),.the second survey involved about 70 vine farms representing all the Italian regions, the third one was conducted in the ambit of EU-Life TOPPS Project (www.topps-life.org) and it was specifically targeted on 100 vine farms located in the area of Alba (Cuneo), in Piemonte region (North Western Italy).

Results

Results pointed out that in greenhouse farms almost all operators (92%) clean the empty pesticide cans and add the cleaning water to the pesticide mixture to be applied. Empty and cleaned cans are sent to specialised collecting centres (34%), thrown in dumping grounds (48%), burned (9%), or stored in the farm (9%). Most farmers (94%) use to clean the spray equipment after each pesticide application and with water only (98%). Average amount of water used for the equipment cleaning is 42 L. Rinsing water is drained on the ground (53%), sprayed on the crop (33%), thrown in the sewers (14%).
In vineyard 71% of farmers rinse the external surface of sprayer after each pesticide application with, on average, 107 L of water and 100% of farmers rinse also the internal part of the tank and the hydraulic circuit with, on average, 120 L of water. Sprayers external cleaning is carried out in the farm court (91%), always in the same area (97%), that is not a paved area (therefore the rinsing water cannot be collected and is drained into the soil). When internal rinsing is carried out directly in vineyard (54%), rinsing water is sprayed on the crop (79%) or drained on the ground (21%).

Revegetation through hydroseeding in degraded mediterranean areas

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Keywords: vegetation cover, restoration, semiarid

Objectives

Hydroseeding involves the application of a complex mixture of seeds, fertilizers, vegetable adhesives, mulch and water on lands through a suitable hydroseeding machine. It is increasingly used to establish vegetation on large degraded areas in order to perform the environmental protection.
In this study we present the results of a research carried out in Sicily in order to experiment revegetation of degraded sites using different types of hydroseeding.

Methods

The tests were carried out in October 2010 in the territory of Sciacca, province of Agrigento (Sicily). The vegetation development controls were performed till December 2011. The machine used for hydroseeding was the model 500L by Agrotec, Padova, Italy.
Preliminarily to the tests, an annual study was conducted aimed at identifying the native plant species. After identifying the composition of mixtures suitable for the intervention on the basis of geomorphological, soil and climate characteristics of the area, we delimited five experimental plots, numbered from 1 to 5, where different types of hydroseeding were applied:

- Plot 1, bonded fiber matrix hydroseeding (test 1);
- Plot 2, thick hydroseeding (test 2);
- Plot 3, reinforced hydroseeding plus water retention (test 3);
- Plot 4, reinforced hydroseeding (test 4);
- Plot 5, control.

Expected Results

The results of the first year checks show that thick hydroseeding provided the best performance in terms of vegetative cover of the hydroseeded species. The results of the second year checks are under elaboration.

Development perspectives of electronic systems in pest control strategies

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Keywords: pheromone trap, codling moth, pest management

Aim

The aim of the work is to evaluate the application of electronic systems in the pest control strategies. Since 1994 the approach has been developed and progressively implemented with automatic systems designed for pheromone traps. Nowadays first automatic devices start to be available on the market.

Methodology

A commercial pheromone trap designed for monitoring the codling moth was integrated with commercial electronic systems to ensure an automatic monitoring of the pest. The performance of the prototype was checked in an apple orchard in the 2010 year.

Results

The efficiency of the automatic trap has been demonstrated in terms of number of insects captured and easy identification of the moths from a remote server. The different components of the automatic trap worked properly in the field evaluation. The exposure of the trap prototype to the environmental conditions did not affect the performance of the automatic system.

Conclusion and perspective

The results obtained allow a wide application of the electronic systems to other trap types, such as the ones designed for the food industry context. The automatic trap designed could be considered as a base for the development of commercial systems. The development of the electronic technologies will improve the spread of automatic systems in the pest management.

Innovative strategy and machines for non chemical management of weed seed-bank and actual spontaneous flora in turf grass

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Keywords: flaming, steaming, turfs

Objectives

Weed management is a major issue not only in agriculture but also in cities and in public and sport turfs. As a matter of fact, in the latter case an effective control of weed flora is needed in order to maintain a high quality and functionality of the turf. Actually, weed control in turfs is performed by means of very high amount of herbicides. This kind of management is very dangerous as it is connected with very high risks of environment pollution and consequently for operators and citizens safety and health. In this context, public concern about agrochemical use in turf is more and more increasing and there is a clear need to define and use alternative and non chemical methods of weed control in turfs. This paper aims to summarize the main results achieved by the University of Pisa in about three years of research carried out on the possible application of thermal weed control in turfs.

Methods

Concerning with thermal weed control in turf-grasses, both steaming and flaming were tested and compared to herbicides application in order to achieve the complete control of an old lawn composed by Lolium sp. and Festuca sp. aiming at a replacement with a Cynodon ibryd obtained with an innovative sod planting technique. For this purpose, innovative machines designed and realized at the University of Pisa were used. Moreover, the application of activated steam by means of a very innovative self-propelled machine, able to well control weed seed bank, was tested before the planting of a warm season turf-grasses on tilled soil.

Expected Results

The preliminary results of these experiments showed that thermal treatments realized applying both steam and open flame at different doses allowed to obtain levels of weed control comparable to those reached by herbicides application, stressing the very good future perspectives of these innovative techniques in order to guarantee environment safety in high quality functional turfs.

Medical geology and assessing effects of radioactive contamination on human health

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Keywords: medical geology, radioactive contamination, hazard index, cancer, Iraq

The hazard index (H) of the radioactive contamination from Uranium, Thorium and Potassium in soils and surface sediments and its impacts on human health were highlighted in this study. The anthropogenic source of the contamination was due to an accident case during 2003 at a U-radioactive Waste Grave 40 km West of Mosul city at Northern Iraq. Surface soil and sediment samples were taken from locations around the contaminated site and within the site itself it in addition to samples from Tel-Serwal and Al-Ragrag Villages. The both villages were Hydro-geologically located down stream next to the contaminated site.
The calculated hazard index (H) result values shows that the impacts of the radioactive contamination advanced through out the surrounding area specially down stream positions, and reaches a secondary school at Tel-Sarwal village. This note were supported by a local hospital which documented that two pupils of the secondary school died suffering from cancer, in addition to the abnormal increasing in cancer cases after the contamination event in 2003 in the both villages.
The hazard index values rated from less than (0.01) in positions up stream the contaminated site, and maximum (5.5) down stream. Six localities shows hazard index value more than (1.0) which is the normal case for safe or the accepted level of contamination in soils according to the international regulations.

Implementation of a system for evaluation risk and management safety in an Italy farm

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Keywords: agriculture, risk assessment, prevention and protection's measures

Aim

In Italy accidents in agriculture are a major part of total accidents at work.
The aim of this study is to develop and apply tools for the analysis of risk assessment and its use of integrated methods aimed at security management in the Azienda Agraria Didattico-Sperimentale of Università Politecnica delle Marche. The measurements on the structures, areas, machinery and equipment company are made. The results are elaborated and organized to quickly identify risks found.

Methods

The survey has been performed in the years 2010-2011 in the Azienda Agraria Didattico-Sperimentale of Università Politecnica delle Marche.
In order to analyze the risks assessment, a mechanism based on some indicators has been planned. The measurements were carried out "in the field", through inspections, not neglecting, however, the news gleaned from the documentation provided by the Azienda Agraria itself, and interviews with workers.
To evaluation risks a database and check-lists to gather data have been created and used. The check-lists are instruments for self evaluation which permit to verify carefully the status of implementation of health and safety in the environment, in the spaces and the quality standards of the equipment

Results

The collected information and the performed elaborations highlight the critical points and identify risks. The elaborated data show risks arising from physical agents such as noise and vibrations, plants and equipments, manual handling of loads and risk from carcinogenic and mutable agents. The most obvious deficiencies are in fact mainly due to the lack of systematic checks on plants and equipments: the Azienda Agraria is directed to enhancing the training and information plans about safety and health in agriculture and measures inspection of facilities and equipment to avoid a deterioration of the security conditions within the Azienda Agraria.

Conclusion and Perspectives

The risk analysis carried out reveals a situation generally acceptable. The necessary improvements are presented to restore the optimal security conditions.

Innovative strategy and machines for physical weed control in agriculture and urban areas

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Keywords: flaming, weeding, sustainability

Objectives

The aim of this paper was to present innovative strategies and machines for physical weed control on vegetable crops and on hard surface in urban areas, defined in order to avoid the use of herbicides, thus allowing to guarantee a high level of environment.

Methods

The operative machines for physical weed control were designed, built and optimized by the University of Pisa. They are based on different working principles (mechanical and thermal means for agriculture applications and only flaming application for hard surface treatments in urban areas). Experimental on-farm trials were carried out on fresh marketable spinach, processing and fresh market tomato, cauliflower, savoy cabbage, greenhouse cultivated leaf beet, garlic, chicory, fennel and carrot. The conventional farm weed management system was always compared to the innovative system. The innovative strategy was the combination among preventive methods (false or stale seed-bed technique), cultural methods (crop spatial arrangement adjusted as to improve machinery effectiveness) and direct control methods (flaming, hoeing, etc.). Concerning with weed control in urban areas the researches were carried out in Livorno and Pisa. Flame weeding at low and high frequency was compared to the conventional management based upon herbicides distribution and mowing.

Expected Results

The innovative weed management systems in horticulture always resulted in significant weed reduction and yield increase compared to the standard systems. Regarding urban areas the optimal range of weed density (0-10%) during the entire experimental period was reached only when high frequency flaming was performed.
However, the results obtained both in horticulture and in urban areas, emphasized the very good performances of the physical weed control strategies that showed to be economically sustainable when compared to the conventional chemical techniques, allowing in the same time to guarantee a very high level of environment safety.

Appropriate devices choice for the application of low environmental impact of pesticides in agriculture and urban areas

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Keywords: pesticides control, innovative technologies, natural pesticides, sensor systems

The use of pesticides represent a factor of considerable significance in agricultural activities. In fact, it is estimated that in the world are distributed annually to crops, about 2.5 million tonnes (source: The Pesticides Trust, UK). However, the problems caused by distribution techniques involve considerable pesticides drift. In fact, in 1964 research by Brown (Brown & Pal, 1971) noted that, in the use of the pesticides, only 0.1% of the chemical was effectively absorbed from the insect. Recent research on the pesticides tree application have shown that on average there is a dispersion of product from 50 to 75% divided in: 5-15% for drift, 20-60% loss waste (Doruchowski et al, 2009). The processes of dispersion may affect the environmental compartments such as: air, water, soil, due to surface runoff phenomena, leaching, volatilization, degradation and adsorption of pesticides in the soil. These processes involve risks to the health of the workers and those living near agricultural areas and, of course, are causes to environmental contamination.
The increasing public attention to the search and consumption of low environmental impact products and of high quality, are progressively influencing the differentiation of pesticides production to pesticides of natural origin, which differently from conventional pesticides require, for an optimal effectiveness, targeted distribution and uniformity over the canopy. Thereby the principles of pesticides correct application, always been studied for several years, become decisive in the use of natural pesticides to ensure the success of treatment. Among the commercially available solutions for the optimization of the spraying of pesticides with regard to the open field and tree crops it is possible consider all those types that allow the near approach of nozzles to the canopy: sprayers such as sprayer system with independent modules, in tangential fan and recycling sprayer. In the urban areas is however desirable to introduce those solutions for the substitution of manual devices, providing significant efficiencies and some examples are applied by spraying modules mini-dumper or pick-up can provide a wide versatility of use. Current commercially available technologies for the pesticides management are built in many configurations, allowing a wide range of regulation, which however must be accompanied by technical and operational skills of the user. This condition introduces risk variables in relation to the proper configuration of the spray machine and the correct mode of distribution, problematic, some of which may now be solved by the introduction of sensor systems and operational monitoring tools to assist the operator work.
In the present paper we report the technological advances in the fields of agriculture and urban pesticides control with particular attention to experiences conducted in recent years by the DEISTAF research unit.

Monitoring technique for producing vitamin-B2-rich vegetables

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Keywords: optical sensing, nutrient, green house

Objectives

Information technology (IT) has become an important tool in agricultural engineering to enhance human health and welfare by increasing farm productivity and control agronomic practices. If nutrients needed for human health could be monitored in real time, the amount of those nutrients in vegetables could be controlled to some extent by adjusting growth conditions in green houses. The authors have developed viable methods to detect water and vitamin B2 in living plants using optical absorption or fluorescence monitoring [M. Fukuda, et al., AgEng2008. K. Sasaki, et al., AgEng2010]. The applicability of these techniques to growing vegetables is demonstrated in this paper for human health and welfare.

Methods

The compact and mobile equipment used to detect water- or vitamin-B2-content in growing vegetable consisted of LEDs, a compact spectrometer, and a fibre optic system with a lens. The optical reflection from, absorption in, or fluorescence from growing leaves were monitored under LED illumination, and the contents of water or vitamin B2 were monitored in growing vegetables. The vegetables used were mainly Jew's mallows (*Corchorus olitorius*) and leaf lettuces, which were grown in our laboratory atmosphere.

Results

Vitamin B2 in growing leaves was clearly detected by monitoring the peak at 530 nm in fluorescence spectra; the peak height tended to be proportional to the amount of vitamin B2 in the leaves. Young leaves of Jew's mallow contained low amounts of vitamin B2 and senescent leaves contained scarcely any. A large amount of vitamin B2 was detected in green leaves. The intensity of optical reflection or absorption corresponded to the water content in growing leaves. These results suggested that a system to control the amount of water, vitamin B2, or other nutrients could be devised based on the noninvasive monitoring technique developed in this study.

Conclusion and prospect

We have developed a technique to monitor nutrient levels in growing vegetables and confirmed its applicability to living crops. A system employing our technique will help to produce nutrient-rich vegetables in green houses and/or fields and enhance human health and welfare. This system will be also useful for determining optimal harvest times by monitoring the nutrient contents of growing vegetables and will assist the work of farmers.

Topic 8

“Environment Safety and People Health Protection and Welfare”

Entomofauna harmful and useful study of some agricultural seed lots depending on the chemical treatment against pests from NE Moldavian's climatic conditions

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Keywords: maize, trap, control

Aim

Maize is widely cultivated throughout the world, and a greater weight of maize is produced each year than any other grain. Our aim is to demonstrate that the use of bio-products in pest of corn, giving positive results.
The research is aimed at achieving a study on harmful and useful Entomofauna in some agricultural crops seed located in the territory of NE Moldavian's climatic conditions
In this research, we try to determine entomofauna useful and harmful entomofauna of corn seed lots, but here we present strict pest *Ostrinia nubilalis.*

Methods

The experience was carried out in 2011-2012 in Trifesti - Bivolari microzone. The research was done and these stages of vegetation of corn.
In 2011, entomofaunei collection was done using pitfall traps were placed in 4 of 4 meters and the net entomilogic. Traps were placed in six groups of seeds that we will call Lot A, Lot B, Lot C, Lot D, Lot E and Lot F was determined status of species and number of samples collected from groups A, B, C , D, E, F. Collections will be made and in 2012, in all phases of maize vegetation

Results

In modern agriculture is a greater emphasis on pest control becasuse production obtained is dependent on resolving this problem.
These studies have taken place in all phases of maize vegetation.
The study took place in 10 plots of corn. Here we present the results of the 6 groups, named group A, B, C, D, E, F. In particular, we followed the evolution of *Ostrinia nubilalis* reaching this: In groups A, B, C where using a treatment based on Zenon Karate not find any harmful of *Ostrinia nubilalis* and in groups D, E, F where using a treatment with a bio-based *Bacillius Ahuringiemsis* duplicate were collected.

Conclusion and Perspectives

The conclusion we can draw is that biological bio-products are effective in the future should put more emphasis on their use
As perspective, we appreciate the fact that more farmers will use organic products for pest control.

Research regarding the influence of some organic products on potato yield in an environment from NE Moldavian's climatic conditions

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Keywords: soil fertilization, ecological treatment

Aim

Main aim is to highlight the importance of organic products.
In this study we are trying to prove the necessity, usefulness and positive influence resulting from the use of organic products, considering the fact that the EU attaches special attention regarding the use of these products.

Methods

The experience was carried out in 2011-2012 in Trifesti - Bivolari microzone, who are in an area with temperate climate conditions and is characterized by cold winters and hot summers, with irregular winds, most common in north-west and north - winter and southeast and east - especially in spring, with sufficient rainfall - especially in early summer. It was installed on trifactorial experiences in three replications of the type 4Ax3Bx2C, being studied three varieties of potato. The treatments are: A – Foliar fertilizing, with graduations, a_1- not fertilized, a_2 – NPK, a_3- ECO 1, a_4- ECO 2, B – the variety: b_1 - Velox, b_2 - Volumia E, b_3- Red Scarlet A, C – vegetation treatment with organic herbicide: c_1- treatment with Novodor (4l/ha) ,c_2 treatment with NeemAzal (2l/ha).

Results

Analyzing the influence of fertilization treatments and find that the biggest variety production recorded the variant fertilized classic variety is the difference from the control volume is 179.47%.
When referring to fertilization with organic products, draw the following conclusion: using environmental product ECO1, tubers production increased very significantly from the control,% from the control was 163.48%.
With regard to organic fertilization, it appears that in both where they used these products have obtained very significant production increases, respectively, where we used variants ECO 1, volume is the variety were obtained 30444, and the version used where ECO 2, the variety were obtained volume is 29305 kg / ha, compared to version control VELOX.

Conclusion and Perspectives

Although fertilization classical production increase was the largest, organic fertilized variants have been very significant production increases.
We hope that these results are a starting point for using organic products to potato in Romania and the EU.

Effect of Na_2SO_4 on the behavior of *Atriplex halimus*

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Keywords: *Atriplex halimus*, sodium sulphate, growth

Objectives

Overgrazing, climatic constraints and the lack of rational routes of herds led to a sharp deterioration in *Atriplexies*. It require the implementation of a policy of stocking of good resistance to salinity genotypes with high biomass production and good palatability. In this context we undertook this study with the aim to define the tolerance limits of *Atriplex halimus* in respect of sodium sulphate.

Methods

We propose in this work an experimental study in semi-controlled conditions of laboratory (*in vitro*) to test the effect of the high concentration of Na_2SO_4 on the germination, the ability to rooting and growth of *Atriplex halimus*. This study also allows us to see the quantitative variations of Na^+, K^+, Ca^{++} based on external concentrations of sodium sulfate.

Expected Results

The results show that the seeds of *Atriplex halimus* are characterized by their rapid germination and low sensitivity to high concentrations of Na_2SO_4. The tolerance limit, corresponding to a decrease of 25% germination and 15.52 g/ l of Na_2SO_4. The sensitivity threshold of the dry matter production of the aerial part is between 10 and 12 g/l Na_2SO_4.

The concentration of 8 g/ l of Na_2SO_4 stimulate the growth of *Atriplex halimus*. From 12 g/ l Na_2SO_4, plant growth decreases considerably.

The absorption of sodium sulfat by *Atriplex halimus* plants vitro results in an enrichment of tissues with sodium and a decrease in potassium and calcium. This accumulation of Na^+ in the plant causes a drop in production from biomass.

These results show that the *Atriplex halimus* can be grown in saline environments unsuitable for most crops.

This species may be particularly in arid and semi-arid means of development and fight against desertification.

Effects of tillage and oilseed rape cultivar (*Brassica napus* L.) on soil physical properties and yield

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Keywords: rapeseed, bulk density, penetration resistance, aggregate stability

Objectives

In north-eastern Romania winter oilseed rape crop (*Brassica napus* L.) is of great importance for farmers because it requires relatively low technological costs and guarantees profit even at medium yield levels.
Determining various agronomical properties including soil physical parameters for enhanced oilseed rape (*Brassica napus* L.) yield with low technological impact on the environment can be of great both economic and ecological importance. Our objectives were to determine the effect of different tillage systems and oilseed rape cultivars on soil physical parameters (bulk density-BD, penetration resistance-PR and aggregates hydric stability-HS) and on yield.

Methods

This work reports the results of two field experiments planned as randomized blocks in three replications. Each block represents a tillage treatment: conventional tillage using moldboard plow - 20 cm depth (MT), minimum tillage I using chisel plow (CT) and minimum tillage II using disc harrow (DT). BD was determined using 100 cm^3 steel rings, PR was measured with an electronic penetrometer, and HS resulted according to Kemper and Rosenau method (1986).

Expected Results

The minimum tillage treatments are expected to reduce the impact of agricultural technologies on soil physical parameters, improving soil quality in longterm. Also, it is expected that oilseed rape yield would not be significantly higher in conventional tillage treatment compared to minimum tillage treatments – a more ecologically and economically efficient approach. Tillage practices and rapeseed cultivar may also explain a large part of variation in the amount of oilseed rape yield and soil physical properties, including BD, PR and HS.

Conclusions and Perspectives

The results of this research work can be very helpful for designing appropriate cropping strategies under different tillage practices and rapeseed cultivars (*Brassica napus* L.) for north-eastern Romania. The yield differences ($p=0.05$) between MT, CT and DT treatments are insignificant in most of the tested cultivars. The evolution of physical parameters in time indicates the capacity of soil to recover after tillage operations. MT and DT negatively affect soil structure in the surface layer and increase compaction of soil from the subarable horizon, compared to CT, that affects soil quality in a lesser extent.

Organic Plant Protection Treatments in Greenhouse and Open Field by an Electrical Prototype

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Keywords: plant protection machines, sustainable pest management, horticulture

Aim

The aim of research is to assess the performances of the patented device designed and built by Section of Mechanics and Mechanization of DiGeSA (University of Catania) in order to increase the work capacity of natural enemies distribution and to promote a low impact pest control, as indicated by the recent European Directive 2009/128/CE.

Methodology

Three different versions of the prototype have been used in distribution trials of natural enemy (*Phytoseiulus persimilis* and *Orius laevigatus*) on greenhouse vegetable and flower crops (bell pepper and chrysanthemum) and on open field strawberry crops. For both the beneficials, manual and mechanized release plots were compared using the same rate.
Preliminary laboratory trials has been carried out with inert material commonly used for marketing bottles of beneficials (humid vermiculite and buckwheat husks mixed with humid vermiculite) in order to evaluate the working parameters.

Results

The results of the laboratory trials prove that the dosage and distribution mechanism of the prototype are suited to biological pest control strategies on greenhouse and on open field.
With the version used on strawberry crops, set on a handle directly carried by the operator or mounted on a bar carried by a tractor, the device performance is improved both in distribution uniformity and in manoeuvrability. With the version used on bell pepper the average time to turn the machine has been relatively high because of scanty manoeuvrability. Also the version used on chrysanthemum, with three prototypes carried by a tool-bar applied on a trolley, has allowed to obtain a good uniformity distribution with rewarding work capacity.

Conclusions and perspectives

The trials have shown the versatility of the electrical device with the possibility of extending the variety of potential crops involved. Thanks to the better results in terms of work capacity, costs would be contained when compared with those of manual distribution practiced so far.

Development of a prototype for mechanical distribution of natural enemies

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Keywords: Facilitating machines, Centrifugal distribution, Plant protection

Aim

The European Directive 2009/128/CE involves, among other measures, the compulsory adoption of integrated control strategies starting from January 2014. Moreover, biological and integrated control measures are widely and effectively employed both on vegetable crops and on ornamental crops. The release of natural enemies on crops is carried out manually with a considerable work time and without a uniform distribution. Therefore, a prototype for mechanical distribution of natural enemies was developed and realised. This study refers on the improvement of the prototype carried out to make it adoptable both in greenhouse and open field and on the laboratory tests carried out to assess its performances.

Methodology

Several versions of the prototype were produced without changes in the functioning principle, but only in some of its components, in order to improve the prototype performance and the components coupling. All the improvements were evaluated by means of laboratory tests in order to assess direction of the jet, uniformity of the flow rate, operative width and uniformity of distribution both horizontal and vertical plane.

Results

In order to assess the applicability of the centrifugal action to the natural enemies distribution, laboratory tests were carried out with the first version of the prototype. The possibility to regulate direction of the jet and flow rate of the natural enemies released in accordance to the work conditions was assessed with the subsequent models of the prototype. Also the distribution, evaluated on a horizontal and vertical plane, seems to be suitable for applications in biological control programs. Furthermore, the versatility of the prototype to operate both in greenhouse and in open field has been verified.

Conclusion and Perspectives

A satisfactory flexibility of its use has been achieved with the last version of the prototype. In fact, it is applicable to a bar directly carried by an operator, to a frame or to a tool-bar applied to a tractor or a trolley and it can operate both in greenhouse and in open field. However, others evolutions could be useful in order to make constant the flow rate of the product also during the final empting phase of the hopper.

Methodological application to meet the health impact caused by the use of compost with POP

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Aim

Understanding the health impact of the POPs (Persistent-Organic-Pollutants) contents in the compost used as fertilizer on agricultural crops obtained from the segregation of organic urban waste.
Rate the normative content of POPs in environmental policy and health in Colombia.

Methodology

He developed a systematic review and an analytical study. For the first conduct a literature review of legal texts, by: 1) databases, 2) Google's-use-of–Boolean-operators; Regulators-texts-defined-as-standards-and-codes-on-wesites-of-the-Ministry-of-Environment-Health-and-Agriculture-Colombia. For the analytical study will be a cross-sectional survey using key informants technique by interview and application of the Delphi method.
Key informants will be selected according to the degree of interference you may have about the policy guidelines under study. The Delphi method allows assessing the barriers and opportunities for policy guidelines.
The populations under study correspond to: government managers, technicians, urban compost producers and users that use it for agricultural purposes.
The analysis variables focus on POP chemicals taken at different stages of production of compost.
Finally, the information gathered, conduct the analysis, interpretation of findings, conclusions and recommendations of the study.

Expected result

With the results were expected barriers and opportunities for Colombian legislation on environmental and health related to the establishment of permissible limits of POP in the compost used as an agricultural fertilizer and its effect on health.
The importance of regulating the content of POP is that organic compounds are stable and highly toxic to humans and the environment, they have a great power of bioaccumulation and biomagnification in the food chain.

Evaluation of the health risk for the farm workers operating in contaminated sites.

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Keywords: environment, polluters, health

Objectives

In Italy many agricultural areas are placed in sites contaminated by organic and inorganic polluting substances. In these areas the farm workers can get in touch with carcinogenic and mutagenic agents present in the environmental fields (agricultural soil, irrigation water, air) by inhalation, dermal contact and ingestion. The farm workers exposition to the polluters detected in the water, air and soil must be considered in the risk evaluation contemplated by the Legislative Decree n.81/2008. The aim of this study is the evaluation of the risk of exposition to environmental polluters of the farm workers operating in open field and in greenhouse in the contaminated area.

Methods

The area of study will be the rural area of Melfi (PZ) where high concentrations of trichloroethylene, tetrachloroethylene and dichloropropane have been found in the underground water. In this work the volatilization of the polluters present in the stratum and their concentration in open field and in greenhouse will be estimated. The factors of transport of the polluters from the underground water to the surface will be calculated according to Henry's constant and to the stratum hydrogeological characteristics. The concentration of air polluters will be evaluated according to their factors of transport and to the migration by diffusion and convection in open and confined environment. The farm workers exposition to carcinogenic agents and the related health risk will be evaluated according to the air concentration, to the toxicological properties of the environmental polluters and to the contact frequency.

Expected Results

The expected result of this work is the quantification of the health risk related to the farm workers exposition to the environmental polluters. The obtained risk value can be compared to the limit contemplated into the Legislative Decree n.152/06 in order to verify the healthiness of the work places. The possible overcoming of the admissible health risk threshold makes necessary the identification and application of technical-managing measures aimed at protecting the farm workers health.
The applied methodology, thanks to its adaptability, will be able to be applied to many contaminated agricultural areas and to different types of agricultural buildings in order to reduce the morbidity and mortality related to the environmental pollution of the working places.

Worker exposition to aerosol during the sowing operations with pneumatic precision drills

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Keywords: dust, pesticides, aerosol particulate

Objectives

In the last years it has been reported that pneumatic precision drills used in the sowing of maize (*Zea mays* L.) contribute to the diffusion in the environment of particulate matters derived from seed dressing (or coating) containing pesticides. The problem was particularly relevant for its effects on honey bees (*Apis mellifera* L.) and other pollinating insect populations. On the other hand, the operators can also subject to abrasion dust exposure during the sowing. This can occur differently, such as during the manipulation of dressed seed (opening seed sacks and filling the drill) or during the sowing in the field at the tractor seat. Different factors can affect the magnitude of the phenomenon, such as the presence of a closed cab on the tractor or of devices reducing abrasion dust dispersion.
The paper report the results of first tests aimed at investigating the potential workers exposure to chemical risk during the sowing of dressed maize.

Methods

During field operations, the amount of inhalable dust was recorded by means of personal samplers, during the execution of different operations requested by the sowing of maize dressed seed. For each operation, the amount of dust and active ingredient potentially inhaled has been assessed. At the same time, the air concentration of the active ingredient was evaluated by means of high volume air samplers placed at the edge of the sowed field.

Expected Results

The pesticide residue concentrations in the air and the quantity of potential inhaled powder will be given. The paper will also provide a comparison between the air concentrations values from simulated sowing tests (at fixed point) and the data observed during field sowing operations.

Environmental management systems in sawmills in Calabria

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Keywords: environmental quality, EMAS, timber processing

Objectives

In Calabria, timber processing employs over 20.000 labours, and it is mainly concentrated in the provinces of Cosenza and Reggio Calabria. Timber industries should ensure high quality products, services and processes to improve their competitiveness in the market. This might be achieved only by a proper management system. Therefore, any organization that produces goods and services is now required to consider and guarantee environmental quality. The present study aimed to create a new model for a preliminary review of Calabrian timber factories from an environmental point of view.

Methods

This research assessed environmental performances of the first and second timber processing in Calabria, using a checklist expressly created for this purpose.
The first part of the checklist permitted to analyse the structural and operative characteristics of the different factories. The second part, however, allowed to analyse the environmental situation of the factories, and to highlight the main areas of intervention. Environmental performances of Calabrian companies were valued according to EMAS regulation (Eco-Management and Audit Scheme), based on ISO 14001:2004. Besides, environmental aspects were analyzed through a checklist specifically developed from the Annex VI of the latest regulation.

Expected Results

The aim of the research was mainly to determine priority interventions on specific environmental aspects in view of a considerable improvement of the surveyed sector.
Collected data permitted to have an overview of timber sector in Calabria, describing environmental parameters already present, and determining those that still need improvement.

Assessment of the available databases on tractor fatal injuries to improve the accidents dynamic evaluation

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Keywords: rollover, safety, ROPS

Aim

An assessment on the databases of the injuries occurred in agriculture was carried out in order to verify to what extent the environmental factors influence the numbers and severity of accidents related to the use of the tractor. The study analysed the quality of the information available on the accidents to understand if the data were helpful to the accident dynamic characterization, mainly in terms of performance of the Roll Over Protective Structures (ROPS), so as to point out possible improvements for the prevention of the fatal injuries associated with the use of the tractors.

Methodology

A survey on the data available at the INAIL - Servizio Statistico Attuariale and the local ASLs was carried out. The accidents were analysed in detail for the Provinces of Bologna and Reggio-Emilia identifying the agent (tractor), the mode (rollover) and the geographical location of the event (municipality and altitude).

Results

The analysis of the accident data evidenced that the agriculture, in the Provinces studied, had a higher risk ratio compared to other work environments. The injuries in the two Provinces were more frequently associated with the use of the tractor. In detail the data showed that the tractor accidents caused the higher number of fatal injury. However the data available did not point out the dynamic of the accidents.

Conclusion and Perspectives

Data evaluation aimed at obtaining information on the dynamic of the accidents, mainly in terms of performance of the ROPSs, when fitted on the tractors, did not highlight lacks or failures in the ROPS and/or tractors involved in the accidents. A standard model for collecting the data is required to characterise the causes and the dynamic of the accidents. The standardisation in the data collection will give the required information for evaluating if updated solutions are required to improve the operator safety in the use of the tractor.

Engineering and technical safety provision in AIC (Agro-Industrial Complex)

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Keywords: injury, prevention, decrease

Objectives

Economic activity in respect of agriculture, forestry and hunting is accompanied by high level of injuries. Here, in the Russian Federation, in 2010, about 6145 persons (including lethal outcomes as well) were injured, among them 1730 women and 47 teenagers. The most trauma-dangerous branches are supposed to be animal industry and plant -growing, where suffered number totaled 3122 and 1667 respectively, among them women 1151 and 459 and teenagers 9 and 3, respectively. Modern technical methods, means and practices on trauma precautions are quite ineffective, and their potential possibilities, based on instructive-prohibited activities, in spite of all their urgency, are practically almost settled.

When taking into consideration that more than a half of the injures is connected with machinery, which safety leaves much to be desired. The necessity of the supplement to existing preventive labor safety activities by methods and means of engineering and technical safety provision arises here.

The aim of the research is to substantiate and develop engineering and technical methods and means of injury prevention as well as professional diseases.

Methods

Research methods are based on solid injury analysis, it's qualitative and quantitative data, sources, serious consequences, forecasting development tendencies of prevention ways and counteractions' development.

Expected Results

As a result of the research due to indicated safety methodology of agricultural machines both animal industry and plant-growing production technologies it is determined their incomplete requirements to demands of standard safety system (SSSD). So a number of new prevention methods and means was developed, it allows to pass from strategy and tactics of existing injury decrease (on 1-1,5% a year) to it's dynamic decrease and by certain injury sources- even to it's elimination. Effectiveness of offered conclusions is approved by field research and laboratory practices.

Preparatory groundwork for a safety management system for urban green areas

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Keywords: green maintenance, model, risk analysis

Objectives

Urban forestry works and urban green areas maintenance are high-risk activities and usually source of injuries. The management issues are quite complex, influenced not only by the characteristics of environment and high risk level of some tasks but also by companies' policies in terms of safety management and human factor. When planning and carrying out these activities the professional arborists or gardeners will be faced with a number of health and safety tasks that have to be tackled, such as protecting public health and safety and setting out safe working procedures.

Methods

In this paper we provide the preparatory groundwork for a model useful for describing the real risk level of a job site and giving positive feed-backs for crew leaders and safety coordinators to make decisions and to organize open air activities. We start from data field of 80 job sites of North-East Italy regions and, first of all, gives us a measure of risk in terms of injuries frequency and severity.

Expected Results

The results of risk analysis have underlined the riskiest activities and seasonal variations in incidence rate for difference types of accidents/injuries have been observed. The comparison for all tasks inquired highlights that the behaviour of workers and company safety policies are weak contexts. Indeed the most worrisome values assigned to these activities for lack of identification and reduction of human-related risk. It will be implemented and validated in the future by a large scale investigation, with the goal to begin a complete safety management system (GreenSafety SMS) for urban green areas works.

Topic 9

“Socio-Economic Aspects and Welfare”

Migrant workers in Swedish agriculture and horticulture Part 1: perspectives of employers

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Keywords: seasonal workers, working conditions, labour market

Aim

Finding competent work force is a challange for many farmers and owners of companies within agriculture and horticulture. This is even more a great issue when it´s a matter of finding seasonal workers. During a number of years there has been an increasing share of the work force with a non-Swedish background. But they are not immigrants which are becoming integrated in rural areas – they are migrant workers from other countries. The working conditions for these migrant workers are not well documented and their own experiences and attitudes and not yet studied. There is also lacking knowledge about the perspectives of the Swedish co-workers and the owners / managers on farms with migrant workers.With economical support from the Swedish Farmers Foundation for Agricultural Research (SLF) these issues are studied during 2012-2013.

Methodology

The project has started with a short up-date on other relevant studies, published reports and papers as well as connections with other researchers in this area – both national and international. A web-based survey among employers has been done in the first part of this project.In the following part there will be work-place studies with in-depth interviews involving migrant workers as well as Swedish co-workers and employers in order to get a base-line of knowledge for further actions.

Results

The initial web-based survey to employers was responded by almost 4000 farm employers. About 20% of the responders said that they used migrant workers during 2011, the majority from a country within the European Union (EU). The main reason for using migrant workers was lack of Swedish workers and financial reasons. The migrant workers were used for in many different work operations such as: animal production, weeding, planting and harvesting of field crops, forestry work, construction and maintenance of farm buildings. The major problems were related to language issues, such as: communication, information, misunderstandings etc. The employers wanted further support with information about regulations, information material on different languages and other issues on a web-page or as a practical "hand-book".

Conclusion and Perspectives

The final results will be presented and discussed at a work-shop with involved stakeholders, organizations, authorities, researchers and other in order to create an action plan, a webpage or a "hand-book" for employers and managers as well as a research plan for further research. Further international collaboration including EU-funded projects is important to establish a sustainable labor market.

Recent changes in agriculture practices, an acceptability conditions survey

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Keywords: social, Integrated Pest Managment, evolution, organic farming

Objectives

The aim of this study is to identify and analyze the social and technical dynamics that come with recent changes in agricultural practices like Integrated Pest Management in five production sectors present in Region Centre (France) : viticulture, horticulture, arboriculture, oleaginous and proteaginous productions, organic farming.
These changes induce drastic evolutions in professional expertise and social values for the practitioners that involve various attitudes towards these evolutions.

Methods

The methodology is rather original as it is based mainly on field survey researches implicating interviews and ethnographic observations using video records.
These analytical data will permit the elaboration of several scenarii in favor or not of the acceptation of studied changes.

Results

The expected results are a list of social and technical bottlenecks that restrain the growing of changes in agricultural practices and the conditions for a better acceptability of these changes.

Understanding farmers' willingness to produce healthy and safe products

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The aim of this investigation was to gain an understanding of the factors that might influence farmers' decision to adopt practices that could help them to produce healthy and safe products. The study was based on a research branch that has been developed with the purpose of identifying economic and social-psychological drivers that affect farmers' behaviour (see, for instance, May et al., 2011; May and Tate, 2011; Zubair and Garforth, 2006; Burton, 2004; Beedell and Rehman, 1996; and Carr and Tait, 1991). The aim was to test the hypothesis that farmers' willingness to produce healthy and safe products not only depend on economic incentives, but also on psychological considerations. In order to test this hypothesis, a questionnaire was applied to a sample of ex-sugar beet farmers of the West Midlands region of the UK. The information collected was processed using an econometric approach. The results revealed that farmers' willingness to produce healthy and safe products was indeed influenced by psychological factors.

Village of XXI century in the risk society

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Aim

In recent years there has been a sharp increase of urban population in Russian Federation. Urbanization is accompanied by the growth of large cities, abuse of environment near the industrial centers, the deterioration of living conditions and quality of life of rural population, the decline of general security. The purpose of this work is to reduce as environmental risk so social risk.

Methodology

The way to decide the problem is the elaboration of a new paradigm of development country areas with the formation of a new way of life, based on a simple and healthy rural life. A new paradigm consists of:

a. organization ecological families and cooperative agrocomplexes in the rural areas, using modern technology and mechanization,
b. creation of a favorable social environment for the attitude development of the foster families, fatherless children and children in difficult life situations,
c. social and environmental rehabilitation for persons suffering from alcohol to their full rehabilitation and social integration in society,
d. creating an enabling environment for rural development and the influx of active population in the country.

Awaited results

1. Solving problems of development of rural areas and up-coming transition all villages to the next level of development.
2. Reducing the cost of agricultural production, leading to the figures self-regulatory organizations with production, processing and sale of agricultural products.
3. Modernization of the Russian village, transformation it into a highly social environment based on the needs of people in the community lifestyle.
4. Organization of favorable socio-economic environment for large families and families with the adopted children (it is the key to the future generations of middle class in Russian villages).
5. Involvement people in agricultural production; people, who decided to give up alcohol use and start a full active life, significantly reduce the number of alcohol addicts Russian citizens and enable them to more effectively adapt and get integrated into the rural society.
6. Up-coming transition the level of ecological safety populated centers by reducing the population density and reducing the risks of social character by improving the living standards of the village.

Strengthening technical control for providing safety and health in agriculture and rural areas

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Keywords*:* oil pollution, environmental safety, health

Objectives

Recurrent small leakages and spillages account for about 85% of the total volume of ground water pollution and as a consequence of soil water pollution. At that waste oils that on the whole account for at least 50% of the total pollution with oil products is the most environmentally hazardous in the sphere of agricultural production. Waste oils carbohydrates having low extent of biodegradability (10-30%) and accumulating in the environment, disturb ecological balance. Waste oils toxic components get to human food chains through foodstuff, deposit in adipose tissues, causing cancerous diseases and immune system disorders. The aim is strengthening technical control for providing safety and health in agriculture and rural areas.

Methods

One of the directions of settling of this problem is increase in awareness and efficiency of engineering personnel and improvement of technical facilities of the enterprises and organizations in combination with detailed legislative regulations.
Technical ecology is one more problem of engineering service. In this connection tightening of control over waste recycling shall be accompanied by their efficient processing.

Expected Results

Acquiring of necessary additional skills and knowledge is feasible through completing of periodic postgraduate advanced training or retraining for the corresponding courses on the basis of Institutions of Higher education, Institutes of advanced training and for retraining for agro-industrial managers and specialists as well as for specialized enterprises. It is worth mentioning that some of such programmes can be provided to the interested organizations by St. Petersburg State Agrarian University department "Motor vehicles and tractors", which, if required, can be adjusted and added for the further joint implementation with the Russian and foreign partners.Waste oils are energy feedstock, secondary use of which after proper treatment will allow to extend their life cycle. Different technologies of waste oils regeneration are available, relevant small-size movable plants for waste oils treatment or regeneration, including those at SPbSAU department "Motor vehicles and tractors".
Oils regeneration, carried out taking into account environmental requirements, is justifiably becoming one of the best ways of their recycling. Ensuring increase in local resources of oils production, regeneration protects environment from pollution.

Innovative and legislative components of the safety and health in agriculture and rural areas the north-western region of Russia

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Keywords: environmental safety, health, countryside

Abstract

It has been analyzed the environmental status of the countryside, associated with the development of agricultural production; it has been provided innovative solutions, which in conjunction with legislative regulations and the development of international cooperation in this sphere allow to minimize the results of anthropogenic impact on the environment.

Factors that impact the financial performance of broiler chicken production in Brazil

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Keywords: costs, economic efficiency, social-economic status

Objectives

This study aimed on identifying the factors that affect the financial performance of broiler chicken production in Southwest of Paraná state in Brazil, as well as to study the relationship of these factors with the social-economic situation of the poultry producers.

Methods

Data for this work were obtained from questionnaires, which were implemented to broiler chicken producers during the months of February and March, 2011. These 39 question questionnaires provided information about the producer's age, family size, land possession, capital in broiler farming, gross income per flock, training exposure and broiler farming experience, production magnitude, credit needs, technical assistance, labor, production problems and bird weight at slaughter. These data were submitted to descriptive statistical analysis. The relationship between the described production data and its financial performance was obtained through the Pearson coefficient, at 95% confidence level, using Excel.

Expected Results

A group of the interviewed broiler producers in Paraná state present medium to low financial performance. Some evaluated factors probably will have a positive impact on the production financial performance. The production problems that can affect the broiler production are the environmental challenges in the facilities, bad feed conversion, as well as management problems and low quality chicks.

Influence of Precise Managing on the Competitiveness of Firms

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Keywords: precise agriculture, data and information, enterprise information systems

Objectives

Precise agriculture is the trend of 21st century. It enables effective and economic management in agricultural enterprises. This modern system of farming is based on the principles known and realized by the generation of farmers and smallholders for hundreds of years - from perfect knowledge of their land to single fields with their different characteristics. The development of precise systems is considered an innovative dividing line in the resort of agriculture in the whole world. Precise agriculture is oriented to the maximum usage of the potential of land, crops, machines and a human factor. Modern technologies usage fully respects the sources of nutrients in land, usage of machines within the whole life cycle of plants (from sowing to harvesting). It is possible to use the data from data warehouses for the selection of a proper variety, proper fertilization, plant protection and yield measuring. Nowadays, in connection to the GPS Agro system, there are created special modules. For instance the module of land blocks – registration of land areas, on which the enterprise is run, is directly connected to the Portal of a farmer and it is possible to import all the data.

Methods

The objective of the contribution is to propose the module of further data usage on the basis of realized analysis. The principles of precise agriculture improve the quality of the access to natural factors. Another shift to improve the quality of the environment protection is the proposal to use integrated solution of data warehouses created on the basis of precise agriculture principles. Connection and other usage of data in enterprise information systems, for instance for creating seed procedures, for calculation used in trading with single commodities, for internal accounting, improve the management of the whole agricultural enterprise.

Expected Results

In the Czech Republic, the principles of precise agriculture are used by 15% of agricultural enterprises. On the basis of realized examination in selected agricultural enterprises there will be proposed methodology of data warehouses usage for other managing. Farmers need to find if the methods of management were successful and how to continue next year for annual planning. The result will be the complex tool for the management and control of agricultural enterprises.

Topic 10

“Open Topic”

The physics in the service of medicine. the healing of multiple chemical sensitivity with the use of bio-resonance

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Keywords: multiple chemical sensitivity (MCS), bio-resonance, quantum medicine, herbal medicine, homeopathy

Objectives

Given that this syndrome is very prevalent and difficult to treat and cases have all become increasingly prevalent, with the story of my experience is to demonstrate that you can heal from this terrible syndrome.

Methods

From my personal testimony I can prove that the optimal treatments for MCS are: homeopathic remedies, natural medicines and bio-resonance equipment made especially biolettronica and Quantum Physics, but the chemical medicines and traditional cures and accepted by the medical however, aggravate the symptoms of discomfort, so it's fair to use integrative and alternative medicine such as homeopathy, naturopathy and bioresonance and the choice of a healthy diet and also a genuine and sustainable lifestyle.
Getting sick, feel sick or have a need for intervention in the hospital for a company becomes sick due to MCS, disinfectants, insecticides, plastics, toxic emissions of machinery, perfume, but especially in the use of any anesthetic.
Many workers who work in petrochemical plants, industries, factories in contact with synthetic chemicals, they are sick, many of them are sensitive and may not know that it has acquired MCS, are being treated for depression for other things to exhaustion, from overwork.

Results

Multiple chemical sensitivity, can not be cured by traditional medicine, that is with chemically synthesized drugs, but can be treated with homeopathic medicines and natural medicines, all associated equipment usage biolettroniche bioresonance, I have reported to lead a normal life, because I weighed 89 kg of weight corpeo, after some of bioresonance therapy weighed 76-78 kg and are in constant from 2006 to 2010 today, I no longer have the emotional eating, I had before, I drink in moderation and I deleted all those sophisticated foods that contain additives, sweeteners, diet consisting of foods so I make little handled, processed, and simple, without frutture is also my diet.

The physics department of agriculture. The wheat first quantum biological product in a company in Sicily

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Keywords: omeopathy, agro quantum, organic farming, frequentmeter, frequential analisys

Objectives

Given that a company representative durum wheat conducted according to the specifications of organic agriculture in the year 2010-2011 there was an attack of Fusarium, planting corn, which being in a strong loamy soil, making the wheat attacked yellowish and making suffer, since the company was in organic farming, it was not possible to treat fusariosis prepared with chemical synthesis offered by the corporate market, for which the tests were carried out using natural products and diluted according to the principles of Hahnemann, with a system of dynamics and succussion with excellent results for the cultivation of wheat, safeguarding one's health that has perfused preparations and protecting the environment.

Methods

In June 2011, we created the first quantum product in an organic wheat in Sicily. The experiment was conducted in the territory of Piazza Armerina (EN) in Sicily and precisely in the district at the foot of Monte Navone Cucchiara about 560 msl. The varieties of durum wheat grown were two: the variety Simeto Rusticano certified organic, second generation with a red card.
The soil preparation was done with three processes, two of which in October 2010, and a third in the first week of November 2010, and finally at the end of November 2010 was carried out to sow.

Results

Frequency meter with the sex were also tested the varieties of wheat grown, before sowing between cultivars Simeto and cultivars Rusticano, it is seen that the cultivar was Simeto in frequency by 55%, instead of the variety Rusticano was in frequency for 100 %, because at the end of harvest, as can be seen from Table 4, the yield was 9 Simeto q.li the yield per hectare instead of Rusticano varieties, sown in only two acres of the 10 acres, gave a yield of 25 q . them per hectare, so the variety was grown in Simeto that this company did not give productive results worthy of note, as in the past two decades (Benintende, 1998), when the business was conducted in the conventional, so for the year the 2010-2011 agricultural varieties to choose from was the Rusticano everything is double confirmation is made with a frequency counter that with the direct production.

Evaluation of the volcanic soils pedogenetica some of mount etna with chemical analysis of soil; sat and frequential measurements and multispectral sat analysis

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Objectives

It was considered appropriate to conduct this research on the volcanic soils of Mount Etna to determine the chemical analysis of soils to describe and classify soils, soil frequential analysis comparing the chemical analysis of soils and detection with frequential analysis to detect pollution by electromagnetic waves, and finally were carried out detections multispectral

Methods

10 sites were chosen and surveyed their profiles and horizons with a total of 40 samples (the samples exact count) in soils of Mount Etna, some of which are forest species, to evaluate their characteristics pedogenetiche with the chemical analysis of soils, frequential analysis and multi-spectral detection.
For chemical analysis of soils were used ansalisi Official Methods Of Soil (Various Authors, 1976, Various Authors, 1984). For the analysis of the soil that is frequencial pollution by electromagnetic waves of the environment has been used a frequency meter and for measurements multi spectral with TV-Vector, Oscilloschope with Sensitive sonde.
In the fields of soil from all 10 sites evaluating profiles and horizons have been determined the particle size analysis, which was equal to 90% of sand, a 5% silt and 5% of clay, have not been reported for each horizon because there is high homogeneity., the low proportion in% of clay and silt that we witness in the presence of young soils, since the processes of pedogenesis are recent.

Results

A satellite image is the result of a complex analytical task that summarizes the information given by a set of images collected on different radiometric channels, or on different dates, or other constituents *descriptions* of the area. It can import and use, together which chemical and analytical values of the soil obtained after analysis of soil sampling interest in order to be able to obtain reliable maps of soil, given the loyalty of multispectral images.

Study of the exploitable potential of Algerian Albian drillings

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Keywords: continental midsole, drilling, turbine generator

Objectives

The groundwater of Continental Midsole (CI) is coveted for its water as resources are widely exploited in the Algerian Northern Sahara.
We have noticed the immensity of this energy, the expanded volume of the aquifer and the importance of its use in agriculture. Unfortunately, this potential remains untapped to date. Fortunately, our research team was interested in familiarising the use of this energy.

Methods

This groundwater is characterized by a high flow and pressure at output. It goes from 0.05 to 0.4 cubic meter per second for flow, and 5 to 40 bars for pressure.
Our working method is to make an experience by installing a Pelton turbine on a drilling Albian to determine the electrical power resulting from the conversion of hydraulic power. The next step is to use this energy for agriculture (decrease water temperature from 70°C to 30°C before being used in irrigation).

Expected Results

The hydraulic energy is completely neglected. An investigation on the Northern Sahara Aquifer System (SASS) was essential to prove the existence of this potential. This energy is reflected by an artesianism which is very convincing in most drillings for a lasting time.
The expected results are directly related to the processing capacity of the turbine energy. We can provide up to 7 kilowatts at a rate of 12 liters per second, which corresponds to the energy sufficient to initiate irrigation of the farm nearby drilling.

A long-term application of conventional and conservation practices for durum wheat cultivation

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Keywords: sustainable agriculture, management, cereals cultivation

Aim

Conservation practices represent a solution able to cut down production costs of durum wheat cultivation and at the same time guarantee satisfactory yields while reducing CO_2 environmental impact in accordance with the directions of Community policy.
The long-term experimentation (2005-2010) aimed at evaluating mechanization and energy consumption aspects for the different combinations of machines and techniques distinguishing the experimental years, as well as soil moisture content and crop yield aspects for the cultivation of durum wheat.

Methodology

Three theses were compared: "tillage" "minimum tillage" and "no-tillage" in a representative flat land area, which is mainly used for extensive cereal farming (Mineo - CT - Sicily). Two plot-scale repetitions were carried out for each thesis in plot of about 1800 m^2. The machines and techniques used over the five consecutive years of tests were alternated in accordance with those commonly adopted for the cultivation of durum wheat in the territory where the tests were carried out, excluding the sod-seeding machine.

Results

In general, "no-tillage" thesis showed a better efficiency and timeliness because mean work capacities were always higher than other theses, as well as unit work time of this thesis. In all years, there were a remarkable increase in the yields of the "tillage" and "minimum tillage" thesis and particularly the differences were not significant statistically.

Conclusions and perspectives

In the specific context the results show even if the average yield are lower in "no-tillage" than in "tillage" thesis, the variable costs are also lower. This is due to the greater work capacity in "no-tillage" thesis than in "tillage" thesis as well as the lower energy consumptions.

Effect of spraying nutritional solution "PRO.SOL" and chelated Iron on growth and flowering of Gazania plant *Gazania splenden* L.

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Abstract

The experiment was premeditated to investigate the effect of supplying nutrients into plants vegetative system and study the improving response on plant growth and flowering. Gazania was selected as locally important ornamental plant.
The research was conducted at the Faculty of Agriculture Nursery, University of Kufa, Najaf Governorate, during the growing season 2010-2011 to study the effect of spraying nutritional solution "PRO.SOL" and chelated Iron on vegetative and floral growth parameters in Gazania plant. The experiment was designed utilizing Randomized Complete Block Design (R.C.B.D) in three replicates with two factors; the first was using three concentration levels of nutritional solution PRO.SOL (0.00, 5.00 and 10.00 mg. Liter $^{-1}$). The second factor was four concentration levels of chelated Iron (0.00, 30.00, 60.00 and 90.00 Mg. Liter $^{-1}$). The interaction between the two factors was also analyzed. The means were compared using L.S.D test at probability level 0.05.
The results showed that spraying PRO.SOL at concentration 10.00 mg. Liter^{-1} or chelated Iron concentration level 90.00 mg.Liter^{-1} improved growth parameters. There was significant increase in; number of total leaves per plant, shoot dry weight, leaves total chlorophyll content, number of offshoots, number and length of primary roots, length of the peduncle, number of flowers, petals and flower dry weight. Meanwhile leaf contents of carbohydrates and phosphorus percentage and Iron leaf content increased significantly in comparison with the control treatment (unsprayed plants) which gave the least values. The interaction results showed that spraying with nutritional solution PRO.SOL at concentration level 10.00 ml. L.$^{-1}$ with 90 mg. L. $^{-1}$ chelated Iron had a significant increase in all studied growth parameters; number of total leaves in plant, shoot dry weight, leaves total chlorophyll content, number of offshoots, number, length of primary roots, length of the peduncle and flower dry weight, i.e. the number of flowers and petals gave 8.33 flower and 18.67 petals compared with the control treatment (sprayed with distilled water) which gave 3.33 flower and 13.00 petals. Meanwhile leaf contents of carbohydrates, phosphorus percentage and Iron leaf content increased significantly in comparison with the unsprayed plants which gave the least values.
Results of the experiment may be concluded that spraying nutritional solution PRO.SPL with concentration level 10 ml.l^{-1} and chelated iron with concentration level 90 mg.l^{-1} improved significantly the growth and flowering characteristics of Gazania plant.

Prospects development of thermal power complex use renewable energy sources

Sevidova I., Knau P.G., Dokuchayev V.V.

Abstract

The rise in price of energy resources has led to the need for the search alternative fuels. The purpose of the report is identifying innovative ways to develop thermal power complex.
Fuel briquettes every day gain increasing popularity in the world. The reasons for this – the growing expenditures for the traditional forms of fuel, comfortable maintenance and ecological advantages of boiler equipment for pellets, in connection with the signing of the Kyoto Protocol by the countries of Europe and the obligation to reduce the ejections of greenhouse gases. At present more than 15 million tons of wood pellets are produced in the world per year (excluding agro pellet). The utilized today amount of waste of wood processing and agro-raw material it is already insufficient. The competition of productions for the use of this raw material is strengthening. At the same time in Ukraine is produced over 2 million 3 per year of waste wood, about 1 million tons of the husk of sunflower and more than 10 million tons of straw of grains, the use of which is economically justified. In Ukraine, as of July 1, 2011 there are about 150 companies engaged in the production of briquettes and pellets. 640 tons of biofuel were produced in 2010. Exports of solid biofuel from Ukraine totaled 573.4 thousand tons, according to the consulting company Fuel Alternative. In 2010 export of wood pellets has increased 134.6% of wood pellets - by 76.2%, pellets made of sunflower to 133.4% of briquettes - by 23.8%. The main directions of export of Ukrainian biofuel are Poland, Germany, Denmark, Italy.
The analysis shows that there are considerable resources for reforming the sector by the global transition from old to modern, more efficient economically and environmentally, heat power equipment on biofuel.

Mathematical modeling of the functioning of the catalytic heater for heating a bioreactor of anaerobic digestion of organic waste

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Keywords: biogas, the thermal agitation, the catalytic heating

Aim
Design features optimization of technical and technological systems for anaerobic digestion of organic waste is a promising trend in development processes of energy efficiency and conservation of agricultural production and organic waste recycling sector. In order to increase biogas installations efficiency, it is more productive to use complex solution mainly concerning the tasks of mixing and heating with the use of catalytic heaters that allow to distribute heat evenly in bioreactor, also to abandon hot-water heating system and special heat exchangers or heating casings that enabled to decrease bioreactor steel intensity and to simplify its construction.

Methodology
On the base of work physical principals, the authors elaborated mathematical model of catalytic heater functioning during heating of organic waste anaerobic digestion bioreactor. According to elaborated mathematical model the computing experiment was carried out. With the use of the equation computational modeling was carried out with Microsoft Excel and Visual Basic. Cycles of heater work during heating biogas reactor were modeled.

Results
The modeling results are presented in the graphs and described in detail.
The first graph present the cycles of the object temperature changes in range from minimum to maximum in the modeling process. One cycle of heater work includes: object heating up to maximum temperature; turning off the heater; gradual object cooling up to minimum temperature; turning on the heater.
There are graphs of methane consumption changes by catalyst in the modeling process. The graphs for three values of circulating gas temperatures are similar. They illustrate the graph of fuel consumption needed for circulating gas heating. In the process of object heating equal quantity of methane is consumed that proves circulating gas heating up to needed temperature. During free cooling consumption of methane is 0.
Also there are graphs illustrated methane volume consumed by catalyst in the every moment of time. In the graphs the heating-cooling cycles are presented as segments of linearly increasing volume of consumed gas for the heating processes and segments of constant volume for the processes of free cooling.

Conclusions and Perspectives
1. The results received during the computing experiment of catalytic heater functioning process illustrate physical processes in the bioreactor and catalytic heater.
2. Developed mathematical model allows to optimize suggested constructive solutions of mixing and heating with the use of catalytic heaters according to the criterion of energetic efficiency at maintaining necessary temperature in the bioreactor.

Mathematical model of thermal mixing in the anaerobic fermentation of organic waste

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Keywords: biogas, the thermal agitation, the catalytic heating

Aim

The improvement of methods of organic waste anaerobic recycling is an important trend in biogas technologies development at the present time. In order to optimize constructive features of technical and technological systems used during anaerobic recycling for maintaining required temperature regime it is necessary to research heat exchange processes during all working regimes of the installation and in the whole volume of the bioreactor.

Methodology

To increase biogas installations efficiency in the article [1] it is suggested using complex solution concerning mixing and heating with the use of catalytic heaters. In the suggested installation the mixture of gases escaping after combustion and produced biogas is used for bubble mixing of the fermentation substratum.
To solve the nonstationary problems existing calculus of approximations can be used especially finite difference method, elementary heat balance method, finite element method. To make the description of nonstationary heat exchange processes during heat mixing by heated gas in the bioreactor volume it is suggested using changed elementary balances method which means that the bioreactor volume is divided into elementary geographical shapes in the range of each shape the temperature is equal. Heat currents values, average for elementary time period, are taken as proportional to initial temperature gradient for the certain time period, and increase of heat volume content is proportional to increase of its temperature. It allows to restrict heat impact of bubbles with elementary volume where they are located in the initial moment of elementary time period.

Results

To illustrate the processes happening during heat mixing the mathematical model was developed with the help of Microsoft Excel and Visual Basic.

Conclusions and Perspectives

Changed method of elementary balances allows to model temperature regime change in the whole bioreactor volume during the heat mixing by the heated gas with the help of the stationary heat and mass exchange equations. The developed mathematical model allows to optimize the suggested constructive solutions of the mixing and heating with the use of catalytic heaters according to the criterion of efficient maintenance of required temperature regime in the whole bioreactor volume.

The results of mathematical modeling of thermal mixing in the anaerobic fermentation of organic waste

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Keywords: biogas, the thermal agitation, the catalytic heating

Aim

The improvement of methods of organic waste anaerobic recycling is an important trend in biogas technologies development at the present time. The essential factor influencing the anaerobic recycling process efficiency is maintaining optimal temperature regime in the whole bioreactor volume for methane generation and anaerobic recycling.

Methodology

To increase biogas installations efficiency in the article [1] there is a complex solution of the tasks concerning mixing and heating with the use of catalytic heating devices. In the mentioned installation the mixture of gases escaping after combustion and produced biogas is used for bubble mixing of fermentation substratum.
For optimization constructive solutions it is necessary to research heat exchange processes in the bioreactor volume during heat mixing by heated gas.
To illustrate the processes during heat mixing mathematical model was developed with the help of Microsoft Excel and Visual Basic.
According to developed mathematical model the computing experiment was carried out.

Results

The modeling results are presented as graphs and described in detail.

Conclusions and Perspectives

1. During modeling of temperature changes in the bioreactor volume in the process of the time with and without mixing by a single bubble the results were obtained. They illustrate physical processes in the bioreactor volume during heat mixing by heated gas.
2. The modeling results proves the use availability of the given constructive solutions of mixing and heating with the use of catalytic heaters for mixing by a single heated bubble allows to decrease values of maximum gradient and temperature roof-mean-square deviation in the modeling volume.

Effect of tillage on soybean crop yield and physical properties on a chambic chernozem

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Keywords: reduced till, penetration resistance, bulk density

Objectives

Tillage effects on soil properties are usually site specific and depend upon the interaction of soil and climatic conditions, with soil and crop management practices.
Soil tillage is an important agricultural activity because of its impact on crop production and soil properties. The purpose of this study was to evaluate the influence of tillage on soybean yield and soil physical properties in the pedoclimatic conditions of the Moldavian Plain – Romania.

Methods

The study was carried out in 2010-2012 in an agroecosystem located at Ezareni – The Experimental Farm of the Agricultural University of Iasi (47°07' N latitude, 27°30'E longitude), on a cambic chernozem (SRTS-2003, or haplic chernozems WRB-SR, 1998), 6.8 pH, 2.7% humus content and a medium level of fertilization. The texture of the surface soil is clay-loamy (0–30 cm). The experimental soil tillage systems were as follows: V_1 – disc harrow , V_2 – paraplow, V_3 – chisel plow + rotary harrow for seedbed preaparation, V_4 – plough at 20 cm (control variant) and V_5 – plough at 30 cm. Long-term amount of precipitation at this site is 517.8 mm at an average air temperature of 9.4°C. Soil bulk density was determined on an oven-dry basis by the core method. The penetration resistance of the soils was determined using a digital penetrologger *(Eijkelkamp).*

Results

Soil tillage with disc harrow, without deep soil looseness, leads to bulk density and resistance to penetration values equal with the other variants in 0-10 cm depth. Below this level, in the 10-30 cm depth, the highest values were registered for these variants but without excelling values specific to the soil type. Grain yield was corrected to 14% moisture content. In 2010-2011 agricultural year (the 6th year of these technology testing), on fertilized variants, the soybean yield on chisel treatment was 9.50 % higher that the control treatment – plough at 20 cm meanwhile the paraplow variant only 1% higher. The lowest yield was recorded on disk harrow variant, 2640 kg ha^{-1}.

Conclusion

The changes produced by reduced tillage adoption on soil bulk density and cone index probably did not restrict severely roots growth, with a single exception – Disk harrow treatment where a subsoil compaction pan was detected at 30-35 cm. The potential effects of increased penetration resistance may have some influences on yield.

Perspectives

We consider that problems of soil degradation and protection by conservation tillage should have a more extended place in the Romanian agriculture strategy.

ACCADEMIA DEI GEORGOFILI

La Sicurezza nella Filiera Viticola – Enologica
Safety, Health and Welfare in Wine Growing

Il ruolo dell'informazione e della formazione e i nuovi strumenti visuali per la sensibilizzazione e la partecipazione dei lavoratori alla sicurezza e salute in agricoltura

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Obiettivi

L'obiettivo principale dei nuovi strumenti visuali (visual management) per la formazione e l'informazione sulla salute e sicurezza sul lavoro è quello di creare cultura della sicurezza in azienda e quindi nella società, permettendo al datore di lavoro di ottemperare al nuovo disposto normativo che regolamenta le attività formative. Incentivare i lavoratori nella segnalazione sia delle situazioni e dei comportamenti pericolosi sia dei possibili miglioramenti sulle misure di prevenzione, favorire la partecipazione attiva dei lavoratori al processo di miglioramento rendendoli anche in grado di valutare direttamente i benefici che possono derivare dagli interventi intrapresi a seguito della segnalazione.

Metodologia

I risultati della valutazione del rischio sono tradotti in format grafico direttamente sulla planimetria riportante il lay-out aziendale. Attraverso l'uso di una simbologia di lettura immediata, il lavoratore apprende quali sono i rischi cui è soggetto quando è nella sua azienda, svolge una certa mansione e occupa una determinata postazione di lavoro.
Il "visual management" della sicurezza e salute sul lavoro accompagna il lavoratore con la mappa dei rischi.
La mappa dei rischi contiene le "contromisure" per ogni tipo di esposizione e rimanda a poster specifici con l'approfondimento sui singoli fattori di rischio. Ogni fattore di rischio è esemplificato ricreando visivamente la situazione pericolosa e suggerendo i comportamenti sicuri. Vengono forniti metodologie e supporti grafici per permettere ai lavoratori di segnalare non conformità, situazioni pericolose e possibili interventi di miglioramento.

Risultati attesi

I lavoratori, non solo informati e formati in merito ai rischi presenti in azienda, ma sensibilizzati sulle tematiche della sicurezza e salute sul lavoro, sono in grado di integrarsi nel "sistema sicurezza aziendale" e assumere un ruolo attivo.
L'individuazione delle misure di tutela si arricchisce di nuovi contributi: passa dalla imposizione dall'alto alla condivisione. Il datore di lavoro con strumenti di facile utilizzo per l'informazione e la formazione si sente sempre più incentivato a impegnare delle risorse per queste attività.
La sicurezza viene percepita sul posto di lavoro come positiva e premiante e non come impositiva e penalizzante.
L'indice infortunistico diminuisce, diminuisce il costo non solo economico che dovrebbero sostenere in tal caso l'azienda in termini di mancata produzione, danno di

immagine, responsabilità amministrative e penali, la società in termini di risarcimento del danno occorso al lavoratore e di perdita della potenzialità umana del lavoratore, del lavoratore stesso.

Il rischio negli stabilimenti enologici

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Introduzione

Tra gli obiettivi delle moderne cantine emerge quello del "brand image", dove la cantina non è rappresentata dalla solo produzione viticola o vinicola ma da tutta una sere di caratteristiche ancillari che tendono ad amplificare il valore della pura e semplice bottiglia di vino.
La moderna azienda vitivinicola multifunzionale prevede, infatti, non solo la vendita diretta in azienda ma anche la visita turistica della stessa e questa funzione deve essere opportunamente previsto in fase di progettazione, non solo per l'accessibilità aziendale, ma anche per la sicurezza dei lavoratori e dei visitatori.
La sovrapposizione di diverse funzioni produttive nelle cantine, infatti, può causare interferenze con un conseguente rischio di incidenti, invece, dove adeguatamente progettate, favorisce la facilità di ricevere ospiti e quindi di partecipare a manifestazioni, sempre più frequenti, come quelle collegate al turismo del vino o a itinerari enogastronomici, ecc.
Tutti quest'ultimi ambiti, quindi, assumono particolare importanza in queste cantine ma prioritario diventa l'obiettivi della sicurezza sul lavoro proprio alla luce di questo complesso quadro di attività e all'inserimento di nuove tecnologie che vanno valutate sia per l'impatto sul prodotto vino che su quello dell'ambiente di lavoro che per il concetto di cantina aperta e multifunzionale.

Gli infortuni nelle cantine

Le condizioni di sicurezza della cantine attualmente sono un po' migliori rispetto alle altre attività agricole aziendali in quanto, di fatto, lo stabilimento enologico è più assimilabile ad uno stabilimento agro-industriale, infatti, le operazioni avvengono generalmente in ambiente confinato e le macchine sono standardizzate. Gli incidenti, infatti, sono meno frequenti e meno gravi rispetto al settore viticolo
Altri incidenti, molto frequenti, sono gli urti con oggetti, dove, con questo termine s'intendono, nella maggioranza dei casi serbatoi o parti di macchine o attrezzature. Tale tipologia d'infortunio è legata spesso alla mancanza di adeguati spazi per la circolazione degli operai e, in ultima analisi, alla scadente progettazione e gestione della cantina o del layout impiantistico.
Quindi, se in cantina non c'è la numerosità delle attività e dei luoghi di lavoro presenti nel settore
Durante questa prima fase di studio si è anche effettuato un primo controllo sui principali settori di rischio per poter osservare una correlazione con quelli osservati dal registro infortuni. Nell'ambito della sicurezza dell'operatore si sono rilevati soprattutto problemi legati alla gestione delle emergenze, imputabili spesso alle caratteristiche stesse di molte cantine, localizzate in edifici vecchi, magari di grande bellezza, ma difficili da gestire in termini di sicurezza.

L'analisi del rischio

Recentemente invece si è voluto approfondire il tema dell'analisi del rischio e della sua prevenzione e a tale scopo si è effettuato un campionamento su aziende localizzate in Friuli Venezia Giulia. Dopo aver selezionato il campione si è costruita una matrice di rischio di tipo qualitativo in cui sono riportati i valori di giudizio rispetto al rischio osservato con i rispettivi descrittori, le frequenze di accadimento del rischio stesso dedotte dagli infortuni ed infine un giudizio qualitativo con relativa trasformazione in punteggio per ogni rischio riscontrato.

Conclusioni

Le cantine in genere risultano un ambiente di lavoro a basso rischio specie se rapportate al resto della realtà agricola. Questo è dovuto al fatto che il settore vino è uno dei pochi che ha investito sull'immagine aziendale e quindi conseguentemente anche sul miglioramento degli edifici e delle strutture e quindi, in ultima analisi, anche sulla sicurezza del lavoro.

D'altra parte, visto il ruolo sempre più aperto al pubblico e la sempre maggior multifunzionalità di questo settore richiede una particolare attenzione alla gestione della sicurezza sia dei lavoratori che delle persone che si muovono attorno al sistema cantina.

Il metodo di lavoro utilizzato in questo studio, per l'analisi dei rischi, quale l'applicazione di una check list, è risultato uno strumento pratico e agile per ottenere un quadro d'insieme sulla sicurezza dell'ambiente della produzione vinicola. L'approccio ottenuto con questo lavoro d'altra parte, risulta abbastanza innovativo, in quanto va ad interessare ogni aspetto della sicurezza nelle aziende vitivinicole relativo all'alimento, all'operatore e all'ambiente. I dati raccolti, infatti, hanno portato alla luce numerose criticità, dovute soprattutto ad una scarsa cultura della sicurezza dovuto al fatto che molte leggi sono di recente applicazione (HACCP, EMAS, 81/08) rispetto ai tempi di formazione di una cultura storica della sicurezza da parte degli operatori. Questo, malgrado l'abnegazione con cui spesso sono state applicate, ma evidentemente, devono essere ben interiorizzate per ottenere un consistente miglioramento significativo del livello di sicurezza, anche se, come precedentemente citato, è pur sempre uno degli ambienti attualmente più sicuri dell'intero comparto agricolo.

D'altra parte, se il settore viticolo deve risultare ancora più trasparente nella sua attività di produzione del vino, più recettivo rispetto al fenomeno del turismo enogastronomico e deve rappresentare l'eccellenza nel panorama della produzione alimentare italiana la scommessa sul pieno recepimento del tus 81/08 deve essere vincente.

Il rischio da microclima nel settore vitivinicolo

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Abstract
L'approccio alla sicurezza sul lavoro nel settore agricolo, forestale e agroindustriale non va inteso esclusivamente nella sola prevenzione degli infortuni per i lavoratori, legati principalmente all'utilizzo di macchine e attrezzature, ma anche al raggiungimento di determinate condizioni di comfort e benessere termico.
La valutazione di tale rischio, quindi, risulta complessa come risultano di difficile applicazione idonee misure di prevenzione e protezione. Numerosi sono stati i metodi introdotti per valutare le condizioni di benessere termico sulla base di studi teorici e di indagini sperimentali, come pure si è cercato di correlare tra loro indici descrittori per verificarne la consistenza.
Il settore vitivinicolo è uno dei principali punti di forza della produzione agricola nazionale e, come tale, va tutelato comprendendo la salute e la sicurezza dei lavoratori.
In particolare la valutazione del microclima nel settore vitivinicolo è fondamentale, considerando che le caratteristiche termiche, intese con temperatura, umidità e velocità dell'aria, sono vincolate dal corretto mantenimento delle caratteristiche organolettiche del prodotto finale (in particolare nelle cantine).
Possiamo ricondurre il rischio da microclima in due realtà differenti: 1. outdoor (raccolta e potatura), 2. indoor (con le fasi di Cantina: conferimento dell'uva, pesatura, prelevamento campione, analisi del grado zuccherino, scarico, pigiatura-diraspatura, solfitazione, fermentazione tumultuosa, svinatura, pressatura vinacce, fermentazione lenta, elaborazione, invecchiamento, trattamenti e correzioni, imbottigliamento spedizione e consegna).
I lavori outdoor possono presentare disagi termici relativi principalmente ad ambiente moderati, durante la raccolta nel periodo di settembre, ed ambienti severi freddi durante la potatura nei periodi invernali.
Ovviamente i confronti tra indici descrittori del benessere termico si basano sui dati relativi all'ambiente di lavoro con condizioni microclimatiche variabili in funzione della latitudine, evidenziando in particolare, il notevole peso che hanno il metabolismo e il vestiario nell'influenzare gli indici e come piccole variazioni degli stessi possano portare a risultati molto diversi tra loro se non addirittura contrastanti.
Mentre nelle fasi dove si prevedono lavorazioni in cantine (outdoor), gli aspetti di disagio termico sono strettamente correlati al condizioni di umidità e temperatura che risultano necessarie al mantenimento della qualità del prodotto, e con riferimento anche alla qualità dell'aria dovuto presenza di esalazioni derivate dalle lavorazioni per la produzione (l'anidride carbonica derivante dalla fermentazione del mosto, l'azoto utilizzato per evitare la ossidazione del prodotto in caso di serbatoi riempiti parzialmente, l'anidride solforosa utilizzata per la solfitazione del mosto, sono tutti gas rilasciati in atmosfera in modalità diffusa (senza essere né convogliati né abbattuti).
Tali gas sono altamente pericolosi per le attività che coinvolgono il lavoratore, soprattutto per gli addetti all'utilizzazione di attrezzature meccaniche, a causa di possibili infortuni collegabili alla loro inalazione.

Ai fini di una corretta valutazione del rischio microclima per questa tipologia di settore, l'utilizzazione di normative tecniche è fondamentale considerano principalmente quelle rappresentate dagli standard ISO, recepiti dal CEN come norme EN ed in Italia dall'UNI. Per la normativa nazionale il microclima è uno dei rischi fisici definiti dall'art. 180 del decreto legislativo 81/08 che si limita a generiche indicazioni di "adeguatezza" e benessere. In attesa di uno specifico capitolo questa carenza viene colmata dal riferimento a normative tecniche; queste ultime propongono alcuni indici microclimatici di comfort e/o di stress, indici che permettono di interpretare le condizioni microclimatiche ambientali integrate con il tipo di attività svolta dagli addetti.
Gli autori descriveranno anche i risultati di alcune prove sperimentali svolte in alcune aziende vitivinicole del territorio della provincia di Viterbo, confrontandoli con i dati, non particolarmente numerosi, disponibili in letteratura.

Il Rischio da Sovraccarico Biomeccanico in Agricoltura

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Keywords: Ergonomia, malattie professionali, prevenzione

Aspetti generali

Le patologie da sovraccarico biomeccanico rappresentano ormai da anni una entità nosologica in costante crescita, nel 2003 l'organizzazione mondiale della sanità ha indicato le patologie muscolo-scheletriche come la causa più comune di disabilità fisica che colpisce centinaia di milioni di persone in tutto il mondo.
I disturbi muscoloscheletrici rappresentano un problema in modo particolare nell'agricoltura, come dimostrano le seguenti cifre:

- Il 75% dei lavoratori impiegati nell'agricoltura sono costretti ad assumere posizioni dolorose/affaticanti per metà o più della loro giornata lavorativa, la percentuale più alta di qualsiasi altro settore.
- Circa il 65% dei lavoratori impiegati nel settore dell'agricoltura solleva carichi pesanti per metà o più della propria giornata lavorativa.
- Il 79% dei lavoratori nel settore agricolo è esposto a movimenti ripetitivi delle mani per metà o più della loro giornata lavorativa.
- Oltre il 40% dei lavoratori in agricoltura e pesca dell'UE-15 ritiene che la propria salute sia a rischio a causa del lavoro.
- Solo il 30% dei lavoratori ritiene di essere correttamente informato in merito ai rischi presenti sul lavoro in agricoltura e pesca, percentuale più bassa tra tutti i settori.

Pur rappresentando un settore produttivo in fase di contrazione rispetto alla grande espansione del terziario, i lavoratori agricoli sono circa 13.3 milioni nei 25 paesi dell'Unione Europea, costituendo il 6.6% del totale dei lavoratori europei. Questa categoria di lavoratori è però anche quella che risulta maggiormente esposta ai fattori di rischio di sovraccarico biomeccanico. In Italia, il settore agricolo impiega circa 895000 lavoratori (ISTAT 2008) di cui poco più della metà è costituito da lavoratori autonomi. Nel settore, la gestione della sicurezza si presenta complessa, e infatti la tutela assicurativa italiana in ambito agricolo si avvale di una disciplina distinta e autonoma rispetto a quella del settore industriale. Nonostante si assista ad una "storica" sottonotifica delle malattie professionali, tuttavia negli ultimi anni il progressivo aumento degli eventi denunciati ha avuto riflessi anche nel settore agricolo, passando da 1080 nel 2003 a 3923 nel 2009 e, parallelamente a quanto accade negli altri stati europei, il gruppo più consistente è costituito dalle patologie muscolo scheletriche (oltre 70%), principalmente affezioni dei dischi intervertebrali e tendiniti .

Strumenti di analisi ed intervento

I metodi tradizionali di analisi del rischio da sovraccarico biomeccanico generalmente si focalizzano su studi espositivi tipicamente giornalieri, con un approccio che prevede l'identificazione e la valutazione dei singoli "compiti" che possono comportare un rischio per il lavoratore, per poi arrivare ad una ricostruzione del profilo di rischio per mansione o per gruppo omogeneo di lavoratori. Se proviamo a trasferire queste metodologie immutate al settore agricolo ci troviamo di fronte alcuni ostacoli da superare e tali peculiarità si osservano sia nell'agricoltura più tradizionale, sia nel comparto florovivaistico. Innanzitutto non è sufficiente o meglio, non è possibile identificare una giornata "tipo" sulla base della quale ricostruire una valutazione dell'esposizione rappresentativa di tutte le attività svolte: in agricoltura l'esposizione varia in durata e tipo su un periodo di un anno, seguendo i naturali cicli di crescita delle diverse colture; i lavoratori generalmente si dedicano a più tipologie di colture nel corso dell'anno, inoltre nell'ambito della stessa coltura svolgono compiti diversi durante dell'anno (preparazione del terreno, semina, concimazione, potature, legature, raccolta...) e la stessa tipologia di coltura può presentare differenze regionali importanti. Ci troviamo perciò di fronte a numerose sorgenti di variabilità che portano a identificare moltissimi compiti la maggior parte dei quali possono comportare un sovraccarico biomeccanico delle strutture muscoloscheletriche.

È evidente quindi, che per applicare utilmente qualunque metodologia di valutazione del rischio si debba passare attraverso un processo di semplificazione che ne permetta l'adattamento ad una realtà così variabile e complessa. La semplificazione non può però portare a trascurare quello che è l'elemento fondante di tutte le buone metodologie: una dettagliata e precisa analisi dell'organizzazione del lavoro che si conferma la componente più importante e spesso anche la più difficile da realizzare.

Sono disponibili diversi metodi di valutazioni del rischio da sovraccarico biomeccanico del rachide (lombare) e degli arti superiori, alcuni dei quali di utilizzo già molto diffuso, soprattutto in seguito all'introduzione all'interno della normativa italiana di riferimenti specifici alle norme tecniche internazionali (Revised NIOSH Lifting Equation, OCRA Index e Checklist, REBA, metodo Snook e Ciriello per l'analisi delle operazioni di traino, spinta e trasporto in piano...); per alcuni di questi sono stati effettuati anche studi di associazione tra livello di esposizione e conseguenti disturbi o patologie (NIOSH, OCRA), non sono invece disponibili metodi analoghi che permettano una specifica valutazione del rischio da sovraccarico biomeccanico degli arti inferiori.

Per alcuni di questi metodi (in particolare OCRA Index e Checklist) sono disponibili sperimentazioni volte da un lato a semplificare le rilevazioni e dall'altro lato considerare la rotazione su compiti e mansioni diversificate che avviene, in agricoltura, lungo archi temporali prolungati (fino all'anno).

Environmental and Human Risks in Spraying Vineyard

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Abstact

Progress in the worker and environment risks prevention began in the '60^{s}. The first meeting on "Hill Mechanization" was held by Georgofili Academy in 1959. The other fundamental congresses on "Safety on agricultural works" were organized by ENPI (National Office for Accidents Prevention) in *Grottaferrata* on 1966 and1967. The culture of safety was born and many researches have been developed up to now focused on these aspects also in the viticulture sector. Important to be mentioned are the improvements on labor intensive viticulture, in which have been achieved solutions and equipment to facilitate the operations in inaccessible or difficult areas and so to increase safety levels for the operators also in these marginal agricultural activities.

In this evolutionary process, the Standards Rules have led to relevant conceptual changes on safety management systems, the DPR 547/1955 that focused attention only on the machines, it is improved over in the '90^{s}, with the Legislative Decree 626/1994 for a broader attention on the monitoring of work, and finally, today, with the Legislative Decree 81/2008 has consolidated the results obtained with the previous rules and has added an awareness and sharing of workers on issues concerning the prevention of to humans and environment risks.

In recent years, moreover, the need to reduce the environment impacts of agriculture, has contributed to the development of new technologies for the optimization of crop cultivation and the reduction of chemical emissions. Also, recent specific rules and regulations introduced for all the European nations, require new management approaches aimed to safeguarding the health of workers and the environment. At this purpose, Directive 2009/128/EC on the sustainable use of pesticides introduces new constraints and limitations in the use of pesticides, particularly on the issues concerning the distribution in the field, with the aims of losses reduction and protection of the sensitive areas.

Of great importance have been researches developed on the sprayed pesticide fate that have shown the hazard for the environment, also caused by low toxicity substances for humans, such as sulfur and copper.

The agrochemical waste reduction can be obtained, firstly, with the adoption of appropriate doses per hectare and equipment regulation. If dose is too high, require too many refills, high intervention times with low workable surfaces, high costs, and increase in risks. Conversely, spraying very low doses as to say very small droplets, characterized of high sensibility to temperature and aerodynamic resistance, greatly increase the drift, with huge waste and a drastic reduction of the pesticide effectiveness . Achievements of specific researches give detailed information about correct dose, concentration and related volume sprayer a hectare in the different treatments and conditions.

Periodical diagnostic control, in field set-up, and BAT (best agricultural practices) are the fundamental points of this new developing time of sustainable approach.

Many researches and related assessment procedures are available to evaluate risks on PPP (plant protection products) spray application. The first approach was a study on "Operational Risk Assessment of sprayers by hazard using multicriterion analysis" published on the Journal of Agricultural Engineering Research in 1998¸ the late is EOS (Environmentally Optimized Sprayer) assessment procedure .

Precision Farming and Information Communication Technologies represent a new and complex technology scenario strained to the optimization of the entire agricultural production chain. The different systems of analysis and monitoring, both remote and proximal, have assumed a value more tangible and effectively employable to the agricultural production improvement. Such

systems, multiple and integrable, allowed to recover the ability to specific control upon a large quantity of parameters in large areas.
The new Telematics technology allows to monitor by web spraying operation and by webGIS permits to store data, to have information and to assess the different management and operative choices. The so called "field book", as to say the official report on farm agrochemical use, could be automatically extract with the advantage of site-specific and temporary documental traceability.
These solutions, applied to the sprayers have the aim to increase the vegetation cover, through the targeted application of the jets on different bands of the canopy, allowing waste control. In this way, the new concept is based on the adaptation of the air jet vector and dosage in the different horizontal bands of distribution in accordance with monitored canopy thickness and density. It will achievable through to the progressive costs lowering of the new technologies such as Ultrasonic Sensors and laser LIDAR (Light Detection And Ranging) and the increasing evolution of the level of know-how of the operators towards of these, but especially for the significant reduction of pesticides employed in agriculture. More recent studies related to these issues take into account the geo-referenced application using 3D prescription maps, which allow for the traceability of the applied dose on the plant.
Other important achievement concerns "spot treatment" that it is possible with particular products as the "*spinosad*" in olive crop protection or better by the widening use of controls and models or direct proximal sensors like NDVI or NIR that permit to apply sprayed chemical only in the ill area or in capturing area for insects.
These achievement moved the main objectives of the European project RHEA (Robot Highly Effective Fleets for Agriculture and Forestry Management): a new approach based on Service Companies. RHEA is a FP7 project devoted to the application of Precision Agriculture techniques. For that, RHEA is focused on the design, development, and testing of a new generation of automatic and robotic system for both chemical and physical –mechanical and thermal– effective weed management in agriculture and covering a large variety of European products including agriculture wide row crops, narrow row crops and woody perennials chemical treatment. The consortium brings together the expertise and knowhow of 19 working groups belonging to 15 organizations (Large-scale integration Collaborative project) from 8 European countries with a deep background in topics covering specific expertise in robotics, agronomy, perception and action, manufacturing of agricultural equipment and end-users.
The new high tech equipment, devices and robot require know how, skills, management ability to assure effectiveness of the employed resources; it is supposed to develop service system of enterprises that at least in this delicate passage could aid farm and winery.
The safety at work management and the implementation of sustainable farming models cannot be separated from technical training, which will represent the next strategic action in the Agro-engineering sector. A main aspect to be taken into consider is certainly on the control of sprayers, as required by the Directive on the sustainable use of pesticides; the other important issue, the subject of training, is related to the safety drive of the machines, especially in relation to the agriculture and forestry tractor, as expected from the recent permanent Conference for Relations between State and Regions. In fact, consequently to the frequent and continuous accident phenomenon caused of the tractor in the agro-forestry chains, are expected to achieve a specific theoretical and practical training for inexperienced workers.
This brief exposition gives the wide scenery of the risk control in the farm and in particular in the winery in which it is necessary a large amount of chemicals to protect vine and grape. The sustainable approach it is actually necessary and useful to achieve a high quality production system with appropriate procedures, equipment and farm know-how.

INTERNATIONAL MEETING

“WMSDSs in Agriculture”

First evaluation of the risk from repetitive movements in greenhouse nurseries: annual cycle and multitask analysis

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Keywords: checklist OCRA, database, work organization

Objectives

The aim of this study is to develop an appropriate methodology in the field of musculoskeletal risk in horticultural greenhouse nurseries in eastern Sicily.
During the ordinary activities in the nursery the tasks have been identified and for each task was evaluated exposure to risk through the OCRA Checklist.
This study represents the starting point of a national work group made up of doctors and experts in the field of work place organization, whose aim is to put together simplified methods (database, software) that permit the monitoring and management of the risk of biomechanical overloading in such complex situations as cultivation in protected environments.

Methods

Measurements were carried out in different nurseries located in eastern Sicily.
The first part of the work consisted of the identification of the main sectors and tasks characterising the activities in the (plant) nursery.
The measurements were conducted using the technique of breaking the work into its elementary phases. The tasks were later filmed.
Subsequently, the use of the OCRA checklist made it possible to assess the postural requirement (shoulder, elbow, wrist, hand) for each task and to quantify the biomechanical overloading of the upper limbs.

Results

There are several activities in the nurseries where there is a risk of biomechanical overload due to repetitive movements of upper limbs and the manual movement of loads.
In nurseries also, seasonal work influences the risk and the exposure of workers to biomechanical overloading depending on the task carried out and varies also for the same task according to the intensity and duration.
The observations confirmed that nursery activities show a considerable risk and should be considered throughout the annual cycle.

Repetitive movements of the upper limbs in agriculture: evaluation – through OCRA check list of working activities – of occupational and personal exposure in the short trunk peach culture

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Keywords: Occupational disease, musculoskeletal disorders, upper limbs

Objectives

Repetitive movements of the upper limbs in agricultural labourers can cause the occurrence of musculoskeletal disorders. The survey results, though still preliminary and concerning a small case-report, have put in evidence the link between a high values of the OCRA check list (use of force and type of posture and movements) and the development of musculo-skeletal disorders and indicate for a significant risk the development of UL-WMSDs in agricultural labourers.

Methods

For such reason alternative analytical methods are tries to determine the cumulative risk of the relative duties to agriculture, distributed in the arc of a year. There is a direct relationship between poor health outcomes and adverse working conditions, arising in particular from a high level of work intensity and repetitive work. For detailed risk assessment, OCRA (occupational repetitive action) is the preferred method. It is recommended for Detailed risk assessment because it considers all the relevant risk factors, is also applicable to "multitask jobs", and provides criteria — based on extensive epidemiological data — for forecasting the occurrence of UL-WMSD (upper limb work-related musculoskeletal disorders) in exposed working populations.

Expected Results

The adoption of measures of prevention (structural, organizational and formative) stretches to improve the problems connected with the highly repetitive and frequency of action, with the lack of periods of recovery, with the use of force and the posture.

The biomechanical overload of the muscle skeletal system in the flowers culture

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Keywords: Occupational disease, upper limbs, agriculture

Objectives

The traditional nursery culture did Apulia one of the largest producers of flowers in Europe. This production focuses in Salento (especially in Taviano and Leverano) and in Province of Bari (in Terlizzi's area). Apulia's companies in flowers culture are about one thousand with five thousands of employees and a total turnover of 150 millions of Euros. In the last years we increased imports from third Countries, due to a resumption of exports to ex-Balkan countries (Bosnia Herzegovina, Croatia, Macedonia, Montenegro, Serbia, Slovenia). The great variety of flowering plants that can be grown is a peculiar characteristic of this productive sector. Each type of plant has a cultivation in itself, with planting dates, planting, treatments, flowering, harvest, etc. different from each other.
That is to say that the operations required by each farming in some cases are similar, in other completely different. The ways in which people do the cultivation of flowers are very different among them.
Consequently, the risks due to repetitive movements of upper limbs register Check List OCRA indexes significantly different from each other.
Purpose of the investigation is to analyze the ergonomic point of view of all the processing phases: creation of a new production plant, planting, processing, collection and disposal of old equipment, taking into account the seasonal factor of the production activity. Operations performed by employees related to the specificity of the plant in culture during the course of the year will be evaluated.

Methods

The study was conducted in a company of Terlizzi (BA), which produces gerberas, gillyflowers, alstroemerie and chrysanthemums.
Issues have emerged from pre-mapping concerning work organization, microclimatic conditions, use of chemicals, manual handling and repetitive upper limbs movements.
We assessed the manual handling of loads risk with the application of NIOSH method and the repetitive motion of the upper limbs risk by the OCRA checklist method.

Expected Results

The first results obtained show that the adoption of a program of simple technical and organizational measures could be sufficient to obtain relatively rapid improvement of working conditions and increased productivity.

The biomechanical overload of the muscle skeletal system in the sector of table grapes

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Keywords: Checklist OCRA, NIOSH, upper limbs

Objectives

The importance and spread of cultivation of table grapes in the world is demonstrated by its global production, that as a whole amounts to more than 170 million tons and some 43 countries exceeds the threshold of 500.000 tons. Italy, with its 13 million tons, is the European Country leader in production and export, with crops predominantly localized in the two southern regions of Puglia and Sicily, which contribute respectively about 70 and 20% to the national total. Given the importance of this crop covered in Puglia region, it was considered appropriate to analyze an ergonomic point of view for all the processing phases present in the cultivation of table grapes.

Methods

The study was carried out on a farm located to north of Bari, conducted according to technique cultivation normally used in Puglia and sites located in the communes of Corato, Andria and Trani.
The plants were of different ages (average of 3 rd - 6 th year of production), while the type of farming used was the "tent technique with a double scaffold", the distance between the rows and plants was about mt 2.50X2.50 and the density of plantation of about 1600 plants / ha. The cultivated varieties included seedless varieties (Sugraone, Big Perlon, Black Thompson), early varieties (Victoria, Matilde), age range of 1 ° (Michele Palieri, Red Globe), age range of 3 ° (Italia, Regina), with activities collection concentrated on average from the second ten days of July to the third decade of October. The completion of the development of technical measures such as PVC covers (to anticipate the maturation and/or to delay the harvest of table grapes) and hail coverage, has allowed the firm enlargement of the traditional harvest period.
The study has been programmed with a first screening phase, in which were collected informations on ways of working, on characteristics of the working environment, on examinees, etc.: these general information have allowed evaluating for each operation and for each agent, through the application of the method of OCRA checklist for upper limbs repetitive movements risk and the NIOSH method for the manual handling of loads risk, the presence of criticality in the implementing rules of work and / or in job characteristics.

Expected Results

At the time the study is still underway as the working methodology adopted has provided observation of the entire annual production cycle of a plant in maturity; however, analysis of first results indicate specific issues improvable through the adoption of a program of technical and organizational measures.

Prevalence of upper limb work-related muscoloskeletal disorders in a population of vine and olive growers

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Keywords: Occupational disease, upper limbs, **agriculture**

Objectives

Work-related musculoskeletal disorders of the upper limbs (WMSDs) and spinal disorders reported in the past by the pioneers of occupational medicine have, in the last 35 years, became extremely widespread, reaching epidemic levels, in all advanced industrialised countries. Up to recent times in Italy, no particular attention was paid to these disorders even among occupational health specialists. However some occupational health professionals began to suspect that the situation was very much the same as that reported in other western countries.
In international literature the frequency of WMSDs and spinal disorders are not well investigated in farmers.
The purpose of the study was the assess the prevalence of UE-WMSD in a population of the vine and olive growers.

Methods

The percentages of the pathologies were estimated on the total number of the exposed workers at the beginning of the clinical examination (No= 125; 82 males and 43 females) even if it was not possible to visit all the workers only 42 (22 males and 20 females) of 125 exposed workers were allowed to submit to a clinical examination by a specialist in rheumatology. The medical doctor did only clinical diagnosis (without instrumental clinical tests). In the future the clinical diagnosis will be completed by means of more objective and specific instrumental tests.

Expected Results

The percentages of the pathological subjects was 26.8% of males and 45.5% of females respectively. The prevalence of tendinopathy of the hand and canaliculars syndrome were noted in both sexes, with a higher incidence in the right arm. As expected the clinical evaluation confirmed the presence of a large percentage of upper limbs WMSD due to the high risk in different tasks of viticulture and oliveculture. Most of the clinical diagnosis were myofascial syndromes of the right thumb and of the brachioradialis as well as carpal tunnel syndrome that seem to represent a "clinical target" in the studied population.