

## **Work Related Stress for Greenhouse Workers: a Proposal for Evaluating the Risk in Pot Plants Productions**

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### **Abstract**

**The work, carried out in four greenhouses in Tuscany, has the aim to set a first methodology to evaluate work related stress risks and to provide parameters to activate a project of prevention and promote the organization of wellbeing in the greenhouse sector. The study has analysed, structures, plants, mechanization, organization of the work and the safety structures of the companies.**

**The applied methodology has permitted to evaluate the level of the risk; this one has shown everywhere “low” with the objection of workers in the bigger company where problem in the organization of a large number of workers determined a “medium” level of the risk.**

**Keywords:** risk prevention, stress, wellbeing, greenhouses

### **Introduction**

Working in a greenhouse cultivating pot plants is today done within companies using structures, systems, machines, job cycle and organization processes which can cause stress in workers. The study carried out sets out to create a first methodology to evaluate work related stress risks and to provide parameters to activate a project of prevention and promote the organization of wellbeing in the greenhouse sector.

The evaluation method is based on the analysis of n°5 main themes of which n.3 objective and n.2 subjective:

#### Main theme objective

1. general risk indicators
2. correlated indicators
3. psychosomatic symptoms

#### Main theme subjective

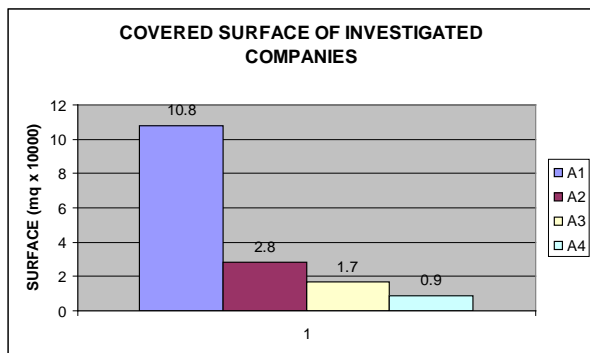
1. stress indicators related to the subjective perception
2. existence of stressful situations outside of work

### **Materials and methods**

The study has been conducted in n.4 tuscany greenhouse companies selected for different dimensions, structures, organization and number of workers.

The companies, named with letters A1, A2, A3, A4, have different cultivated surfaces as showed in chart 1.

### **Chart n°1 - Comparison of surfaces of the different companies**



The related companies have been submitted to visits aimed to acquire information around structures, plants, and instruments employed. The results are related in table n.1.

**Tab.1 - Main features of the structures, systems and mechanization level.**

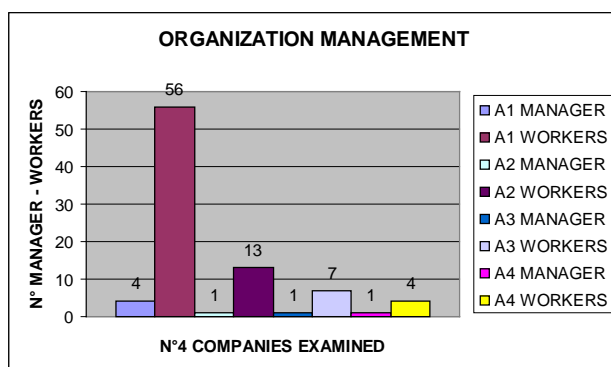
		A1	A2	A3	A4
<b>Greenhouse</b>	<b>Structures</b>	Galvanized steel	Galvanized steel	galvanized steel	galvanized steel
	<b>Coverage</b>	film PE	film PE	film PE	film PE
<b>Plants</b>	<b>Irrigation</b>	Ebb and flow with carriageable floor tanks	Drip irrigation	Drip irrigation	Drip irrigation
	<b>Thermal</b>	underfloor heating	heating indoor air	Heating indoor air	Heating indoor air
	<b>Humidity control</b>	hot air generators	Hot air generators	Hot air generators	Hot air generators
<b>Computerization</b>	<b>Ventilation</b>	yes	yes	yes	yes
	<b>Microclimate control</b>	yes	yes	yes	yes
	<b>Producion management</b>	yes	no	no	no
<b>Mechanization</b>		high	low	low	low

Organization of the work

The companies have various organization management that are related in chart n.2.

The study has investigated the rate between managers/workers and the organization management (fig.1).

**Chart n.2 - Rate between managers/workers**



### Organization of work safety

The study has evaluated also the work safety organization to verify the level of application of the principal law in Italy for the safe at work (D.lgs 81/08).

The structure of the work safety organization of the companies is related in the table below.

**Tab. 2 - Structure of the work safety organization**

COMPANY		A1	A2	A3	A4
Prevention and protection service		Yes	Yes	Yes	Yes
Responsible prevention and protection service		D.L	D.L	D.L	D.L
Company's doctor		Yes	Yes	Yes	Yes
Worker representing		Yes	Yes	No	No
Risk evaluation document		Yes	Yes	Self-certification	Self-certification
ACTIONS	INFORMATION	Yes	Yes	Yes	Yes
	TRAINING	Yes	Yes	No	No

*D.L. = Employer*

### Work cycle, number of involved workers and their duties

The cycle is the typical one that we can find in the production company of the ornamental pot plants, and it is schematically represented by the flow chart of fig. 2.

In the phase of investigations, groups of workers have been selected for homogeneous duties; to these workers were submitted questionnaires to define the factors involved in stress risks.

The elaborated method for the evaluation of work related stress has been discussed then with the holders of the firms with the medical staff and with the workers representative.

The methodology that has been adopted, based on the analysis of three of the five main themes, has allowed to compile an evaluation of the risk based on three tables n.3,4,5 that were used to investigate the main theme objective:

1. general risk indicators
2. correlated indicators
3. psychosomatic symptoms

**Tab. n.3 – Table to evaluate general risk indicators**

General risk indicators	Manager		Employer		Worker	
	YES	NO	YES	NO	YES	NO
Little annoying sound and within standard limits						
Microclimate and Suitable air quality						
Enviromental suitable confort						
Suitable Leeway						
Friendly and not obsolete furniture and ergonomic equipment						
Regular working time						
Absence of fragmented and ripetitive labor						
Absence of contact with public						
<b>Risk evaluation</b>						

**Tab. n.4 – Table to evaluate related indicators**

Related Indicators	Manager		Employer		Worker	
	YES	NO	YES	NO	YES	NO
Absenteism within standard limits						
Accidents on the job and/or occupational disease reduced						
Low, uncommon or non-existent personnel turnover						
Absence of the disciplinary action						
Absence of the conflicts and controversy						
Presence in the company of a environmental, quality and safety work policy						
<b>Risk evaluation</b>						

**Tab. n.5 – Table to evaluate psychosomatic symptoms**

Psychosomatic symptoms	Manager		Employer		Worker	
	YES	NO	YES	NO	YES	NO
Chronic tiredness						
Decreased ability to concentrate						

Mental and physical fatigue associated with more emotional problems (headache, muscle pain, anxiety)						
Skin diseases (eczema, rashes)						
Dyspepsia and gastralgia						
Anxiety-depression syndrome						
Changes in feeding behavior						
Tachycardia, extrasystoles and hypertension						
<b>Risk evaluation</b>						

In this phase there weren't evaluated the main theme subjective:

- stress indicators related to the subjective perception
- existence of stressful situations outside of work

The risk was determined counting the number of "Yes" or "Not" of the various report.

### Results

The evaluation of stress risk has regarded managers, employer and workers. The results obtained are related in table n.6, n.7, n.8. For every job in work organization it was valued the stress risk level as low, medium, high.

**Table n. 6 – Risk evaluation for manager in greenhouses A1, A2, A3, A4**

	<b>A1 -Manager</b>	<b>A2 -Manager</b>	<b>A3 -Manager</b>	<b>A4 -Manager</b>
General risk indicators	<b>6Y/2N</b>	<b>6Y/2N</b>	<b>6Y/2N</b>	<b>6Y/2N</b>
Related Indicators	<b>5Y/1N</b>	<b>5Y/1N</b>	<b>5Y/1N</b>	<b>5Y/1N</b>
Psychosomatic symptoms	<b>6Y/2N</b>	<b>5Y/3N</b>	<b>6Y/2N</b>	<b>7Y/1N</b>
<b>STRESS RISK EVALUATION</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>

**Table n. 7 – Risk evaluation for employer in greenhouses A1, A2, A3, A4**

	<b>A1 -Employer</b>	<b>A2 -Employer</b>	<b>A3 -Employer</b>	<b>A4 -Employer</b>
General risk indicators	<b>6Y/2N</b>	<b>6Y/2N</b>	<b>6Y/2N</b>	<b>6Y/2N</b>
Related Indicators	<b>5Y/1N</b>	<b>5Y/1N</b>	<b>5Y/1N</b>	<b>5Y/1N</b>
Psychosomatic symptoms	<b>6Y/2N</b>	<b>5Y/3N</b>	<b>6Y/2N</b>	<b>7Y/1N</b>
<b>STRESS RISK EVALUATION</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>

**Table n. 8 – Risk evaluation for workers in greenhouses A1, A2, A3, A4**

	<b>A1 - Worker</b>	<b>A2 - Worker</b>	<b>A3 - Worker</b>	<b>A4 - Worker</b>
General risk indicators	<b>4Y/4N</b>	<b>6Y/2N</b>	<b>6Y/2N</b>	<b>6Y/2N</b>
Related Indicators	<b>4Y/2N</b>	<b>5Y/1N</b>	<b>5Y/1N</b>	<b>5Y/1N</b>
Psychosomatic	<b>5Y/3N</b>	<b>5Y/3N</b>	<b>6Y/2N</b>	<b>7Y/1N</b>

symptoms				
<b>STRESS RISK EVALUATION</b>	<b>MEDIUM</b>	<b>LOW</b>	<b>LOW</b>	<b>LOW</b>

## Conclusions

The methodology that has been adopted, based on the analysis of three of the five main themes, has allowed a first evaluation of the risk that also allows to identify the type of organization to prevent work related stress risks and to promote the wellbeing in the greenhouse sector.

All the risk are everywhere low except for workers in big companies that showed a significant level of stress risk (medium). This circumstances was determined by problems concerning organization of the work and overall by the problems in managing multiethnic workers. No problems were found in the structures and plants.

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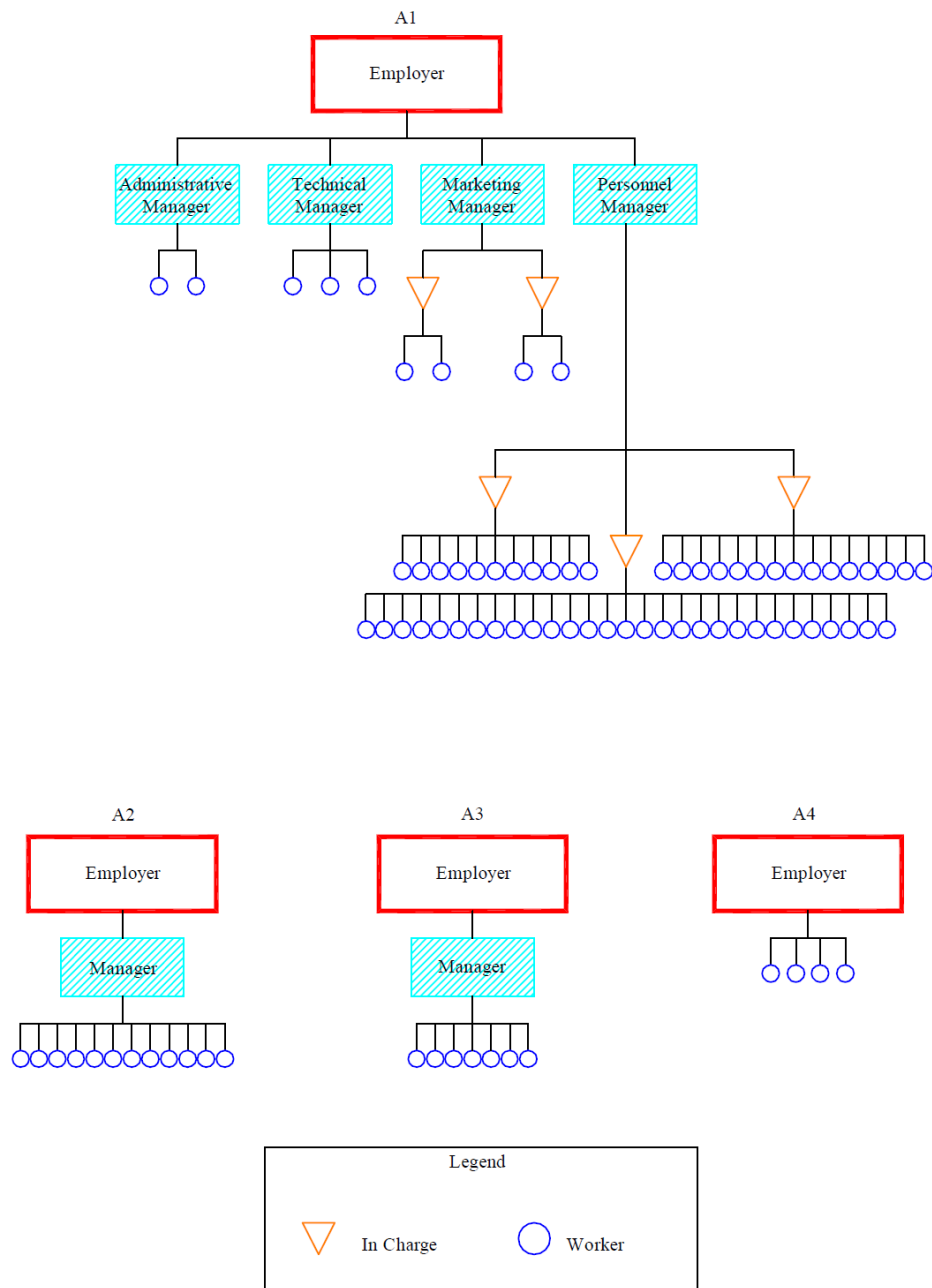
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**Fig.1 – Chart of greenhouse work organization**

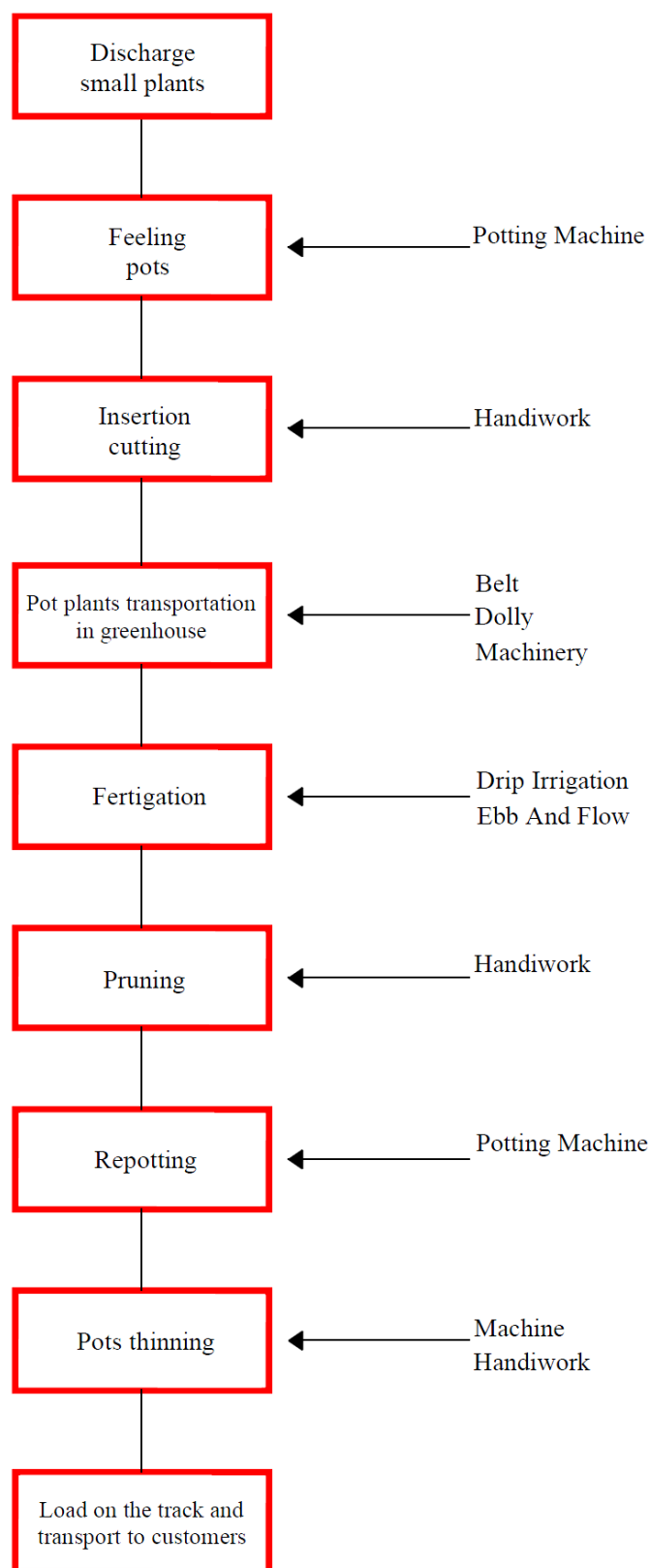


Fig.2 – Flow chart of productive cycle