Environmental control of the phytopathogenic agents protected tomato crops and seed production

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Abstract This paper is proposing a review of combating organic tomato phytopathogenic agents both in our country and abroad, combating performed by using plant extracts and is trying to compile all the information about the chemistry occurring plants (main activity, essential oils) and their successful use in organic farming. Organic farming aims to preserve unspoiled environment using organic fertilizers and minerals, avoiding products that can have harmful effects. Organic farming does not allow the use of synthetic herbicides and pesticides, and weed control agents phytopathogenic is realizing only with products that do not harm the environment.

Organic farming promotes sustainable production systems, diversified and balanced to prevent environmental pollution and harvest. Organic crop production without the use of harmful traditional, experience a special concern for decades in economically developed countries. Interest in products and organic production is increasing in our country. Unfortunately, the areas under the ecological conditions in our country are very low.

Organic farming has emerged as a practical alternative to intensive conventional (industrialized) agriculture based on maximizing yields using stimulating energy-intensive nature of production in large quantities in order to continue the growth of agricultural production for a growing population mainly urban. The use of large amounts of chemical fertilizers, drastic intervention on soil, introduction of genomes with genes that resist to diseases have an impact on biodiversity and biotic balance in soil, water, air and agricultural products with serious consequences on soil’s structure by increasing the risk of erosion, reducing the number of representatives meso - fauna (earthworms, springtails, , etc.) and reducing its natural fertility. The pollution caused by the action of nitrite and nitrate compounds affects the surface water and groundwater and the accumulation of toxic substances in the soil has serious consequences on human and animal health. Following the penetration of toxins in the soil-plant-animal-man circuit irreversible mutations occurred on wildlife micro-, meso- and macrobiotic environmental consequences for the balance and especially on human health.

Since 1980, biologists and ecologists dealing with nature protection put a first signal indicating that without a change of mentality and way of looking at natural resources especially renewable ones, they will disappear and with them the whole civilization will collapse. [7]

Horticultural systems pollution occurs quite often in the plantation field and in greenhouses. It comes from very fine industrial dust such as the metallurgical smoke from different enterprises.

It lodged on plants’ leaves in layers of different thicknesses. It blocks or reduce the process of photosynthesis induce depreciation of fruits’ quality. Also, the powders are lodged on greenhouses and results in reducing the amount of light, which has consequences in vegetables production decrease.

Ammonia, sulfur dioxide and fluorine compounds, such as the acid fluoride of silicon, are very toxic to plants. There are also other pollutants phytotoxic as chlorine, hydrogen chloride, mercury and herbicides sulfur-based pollutants acting on photosynthesis, reducing the process and causing tissue destruction.

Phlorates accumulates in leaves and soil, and chlorine affect flower colours. Pollutants and herbicides, that are excessively become misused, they reach the ground from here get in fruits and vegetables especially tomatoes and grapes. [6] Lately appeared numerous scientific and information work advocating for the expansion of organic farming in order to safeguard, environment, preserving natural balance, maintaining soil fertility, obtaining valuable products of biological and hygienic, that does not affect health consumers. [3]

Organic vegetable crops considered in the context of sustainable agriculture only if it meets the minimum requirements that agro. The requirements are well covered by existing legislation for the organic food. Organic fruit and vegetables used as food cannot be separated from the plants that produced them or to

Key words

organic farming, phytopathogenic agents, environmental control, biopesticides, plant extracts
the substrate on which they were developed, or the environment in which the crop was obtained.

Pathogens cause significant yield reduction but can be dangerous product focus for health consumers, especially toxigenic microorganisms that need to protect food. Pests cause damage either by reducing crop quality or by reducing the amount of production by destroying flowers, fruit, or even whole plants.

Notion of “vegetable” must be understood in a broad sense, because it is part of the plant used in food and nutrition due to their special features. [1] Currently the term “vegetable plants” means a group of food plants from which are used different organs that can be eaten raw, cooked, pickled or preserved, ensuring body large quantities of vitamins, enzymes, hormones and volatile mineral elements. (Indrea. D.,1979).

In comparison with other products used in food, such as bread, milk, meat, vegetables contain smaller quantities of proteins, carbohydrates, lipids, and therefore have a lower energy value but a large amount of vitamins and minerals. [2]

Tomatoes are vegetables from solanaceae group, recently called Solano-fruiting plants. This name is widespread in almost every languages. (H. Butnariu, T. Panait ). The scientific name of the tomatoes is Lycopersicon esculentum. They are one of the most important vegetable species in our country. This is because they can be eaten fresh and processed in various ways. The tomatoes are considered very demanding to the environmental factors and can be grown in greenhouses, tunnels and even lower in seedbeds.

From tomato are consumed the fruits at physiological maturity, but also those that do not reach this stage. Their fruits have a pleasant taste and a high food value. They contain vitamins, carbohydrates, proteins, organic acids, mineral salts, with an energy value of 20-35Kcal/100g.

Because of excess of the base, tomatoes acts physiologically as alkalizing, which is favorable for the body. Chemical composition of the fruit is greatly influenced by variety and external factors. It has been shown that tomato fruits contain vitamins such as A, B1, B2, B3, vitamin K, vitamin C, iron, magnesium, sodium, potassium, phosphorus, fluorine, leucine, isoleucine, tyrosine, threonine, tryptophan, lysine, hystidine, arginine.

For culture in greenhouses and conservatories using F1 hybrids with resistance to many pests and diseases induce the adaptation to lower light conditions in some periods, the precocity pronounced, uniform fruit shape and size, uniform colour and resistance to transport. [3]

The most common diseases occurring in tomatoes are hand tomato (Phytophthora infestans), root rot, stem and fruit (Phytophthora nicotianae var. parasitica), powdery mildew (Leveillula solanacearum), septoria (Septoria lyopersici), alternaria (Alternaria solani), bacterial wilt (Clavibacter michiganense pv. michiganense).

Phytophthora infestans is a common disease in all countries where tomatoes are grown, causing losses of 10-30%. Attack of the tomato manifests on leaves, stems and fruits and is very damaging. Infection occurs at a temperature of 15-17°C. Initially, basal
leaves are attacked. The most damaging form of attack and the most characteristic is the fruit. On tomatoes, brown spots appear purplish, larger or smaller, which initially formed around the stem and then cover the whole fruit. On appeal fruit surface is formed, under favorable conditions, sporulation consists of sporangiophore and sporangia.

Leveillula solanacerum - The disease is frequently in crops of tomatoes, peppers and eggplants in greenhouses and solariums, causing damage to the plant defoliation. Disease symptoms are similar to tomatoes, peppers and eggplant. On top spots appear on the leaves epiphytic angulated, bounded by ribs, pale yellow, which on the underside associated with a whitish-gray bloom, consisting of secondary mycelium, conidia and conidiophori.

Clavibacter michiganense pv. michiganense - The disease manifests itself differently, depending on the plant organs. The main symptom is wilting of plants attacked. Stems attacked the local stripes blackish gray, in respect of which tissues are formed cracks and sores (cancers) open. Fruit infection occurs locally or via the vascular system of the stem. If systemic infection, were the attack is spread on yellow fruits, brown conductive vessels and small and brown seeds with low germination. Local infection causes the fruit to white circular spots, which become yellow and brown in the middle point. This symptom is known as the “bird’s eye”. The pathogen is Clavibacter michiganense pv. Michiganense is part of the Microbacteriaceae family, Actinomycetales order. [5]

Fighting pathogens and pests can be achieved by several methods:

- physicochemical methods;
- herbal methods;
- genetic methods;
- biological methods.

Organic farming uses biological pest control and is gradually renouncing at chemical treatments. Biological control by phytotherapy fungi, bacteria, viruses and insects specific horticultural crops can be made by using plant extracts and natural products.

**Materials and Methods**

This review was made after consulting various research studies. These studies describes the ecological possibilities for controlling tomatoes vegetables pest, in general and in particular.

**Results and Discussions**

National Research Institute for Biotechnology in Horticulture Ştefăneşti Arges uses for combating the phytopathogenic agents from ecological culture of tomatoes some plant extracts.

Table. 1

<table>
<thead>
<tr>
<th>Name of the plant</th>
<th>Extraction way</th>
<th>Age</th>
<th>Use</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equisetum arvense</td>
<td>Steeping, infusion, boiling</td>
<td>Whole year</td>
<td>On plants end sol</td>
<td>Strengthening plant Aphids, mites</td>
</tr>
<tr>
<td>(horsetail)</td>
<td>Steeping</td>
<td>Summer</td>
<td>On plants end sol</td>
<td>Disinfection of seeds, seedling disease prevention.</td>
</tr>
<tr>
<td>Urtica dioica (Nettle)</td>
<td>Steeping, infusion</td>
<td>Whole year</td>
<td>On plants, the germination, on the sol</td>
<td>Fuzarioză blooming white beans</td>
</tr>
<tr>
<td>Matricaria chamomilla</td>
<td>Steeping</td>
<td>Summer</td>
<td>On plants end sol</td>
<td>Disinfection of seeds, seedling disease prevention.</td>
</tr>
<tr>
<td>(Chamomile)</td>
<td>Steeping</td>
<td>Spring - summer</td>
<td>On plants</td>
<td>Disinfection of seeds, seedling disease prevention,</td>
</tr>
<tr>
<td>Taraxacum officinalee</td>
<td>Steeping</td>
<td>In may three times</td>
<td>On plants end sol</td>
<td>Against mites on strawberries and cucumbers</td>
</tr>
<tr>
<td>(dandelion)</td>
<td>Infusion</td>
<td>All year</td>
<td>On plants</td>
<td>Against foliar diseases of tomato</td>
</tr>
<tr>
<td>Allium cepa, allium sativum</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Skimmed milk or whey</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mahonia aquifolium</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>(Mahonea)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Berberis vulgaris (barberry)</td>
<td></td>
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<td></td>
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</tr>
</tbody>
</table>


Biological control of fungi, bacteria, viruses and insects can be achieved using plant extracts. Mature plants contain large quantities of useful substances, but their extraction is difficult, due to the presence of layers because of the presence of protective layers of cells.
Keeping cold extract is concentrated over a relatively short period of a few days. Preparation of the extract will be used in amounts up to two successive treatments. It is important to change the combination products of the mixture from the other treatment so as not to habit pests. Herbal products will be applied more effectively on cloudy, cool or evening, as it maintains the plant for a long time.
In order to combat mildew (*Phytophthora infestans*) it has been used Cameroon extract in ethanol and methylene chloride, Volume 1: 1 of the plants as shown in Table 2. [4]

<table>
<thead>
<tr>
<th>Botanical name</th>
<th>Family</th>
<th>Parts used</th>
<th>description</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cupressus benthamii</td>
<td>Cupressaceae</td>
<td>leaves</td>
<td>Tree (25-30 m)</td>
</tr>
<tr>
<td>Pacchzpodanthium staudi</td>
<td>Annonaceae</td>
<td>bark</td>
<td>Tree (18-28 m)</td>
</tr>
<tr>
<td>Dracaena deisteliena</td>
<td>Dracaenaceae</td>
<td>leaves</td>
<td>Shrub</td>
</tr>
<tr>
<td>Erigeron floribundus</td>
<td>Compozite</td>
<td>leaves</td>
<td>Herb</td>
</tr>
<tr>
<td>Lantana camara</td>
<td>Verbenaceae</td>
<td>leaves</td>
<td>Shrub</td>
</tr>
<tr>
<td>Bryophyllum pinnatum</td>
<td>Crassulaceae</td>
<td>leaves</td>
<td>Herbs</td>
</tr>
</tbody>
</table>

In Brazil, the extracts of plants used for the control of pathogens have been obtained in particular tree species such as eucalyptus, neem and herbaceous species (garlic, basil, mint, ginger, camphor, yarrow, citronella). Apart from these and other studies that have been made in order to identify plants whose extracts have compounds with biological activity that induce plant resistance to some diseases.

The aqueous extract of turmeric rhizome is used to control *Alternaria solani*. Sclerotinia measured the effect of the aqueous extract of ginger at concentrations of 1, 5, 10, 15, 20 and 25%. The aqueous extract of ginger application ground near the plant has caused a higher peroxides activity, and reducing the incidence of diseases.

Wild basil extracts were tested *in vitro* on *Sclerotium rolfsii*, *Phytophthora* sp. and *Alternaria* was an Alternaria mycelium growth inhibition by 100%. Below are examples of various plants that were tested together. Extracts of *Cymbopogon cirtatus*, *Curcuma longa* and *Rosmarinus officinalis* are used to control diseases (*Septoria glycines* and *Cercospora kikuchii*) and powdery mildew (*Microsphaera diffusa*). *R. officinalis* and *C. longa* May 1% to 10% had the same effect as a fungicide and to control powdery mildew.

Some of these extracts, such as *C. longa* to 10%, in addition to the efficient control of powdery mildew disease on soybean delaying season. Ejechi. (1999) studied the extract of pepper against rot in tomato and Jasso de Rodriguez et al. (2005) assessed the activity of *Aloe vera* pulp fungal mycelium growing *Rhizoctonia solani* and *Fusarium oxysporum*. They reported that the extract reduces colony growth rate of *R. solani*, *F. oxysporum*. *T. vulgaris* extract consists of thymol (38.73%), carvacrol (19.31%), β-cements (10.13%) and...
α-terpinolene (5.94%), while the extract of Z. officinale consisted mainly gingerol (46.85%), cedrene (8.39%), zingiberene (7.41%), respectively, α-curcumene (7.32%). Due to the principles active, it has been shown that extracts of Chain paniry, Salvadora persica, Tyumus vulgaris may be an alternative to control diseases caused by phytopathogenic agents. [8]

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