

TEC-CHIHUAHUA
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MAIN PROBLEMS OF CHILI PRODUCTION

State of Chihuahua



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Introduction

Chili is one of the most emblematic products of Mexico since it is used as a primary ingredient in food, which is present in almost all Mexican food dishes, due to its color, flavor and texture qualities^[1].

The production of chili is of great importance both in the cultural area of Mexico and in the economic development of the country. Nationally, a production of 3,296,874 tons has been registered in an estimated area of 161,285 hectares, generating a production value of more than 29 billion pesos^[2]. Being part of the 5 countries with the highest production of fresh chili worldwide together with China, the Netherlands, Belgium and Turkey^[3].

Among the states with the highest production of chili in Mexico is Chihuahua, which ranks first in production with more than 820 thousand tons and about 6,300 million pesos^[4].

However, its productive potential has been affected by various diseases caused by bacteria, viruses and fungi^[2]. In the state of Chihuahua there has been a high incidence of problems with pests such as weevils and diseases such as powdery mildew and wilt and/or damping off.

PEPPER WEEVIL *Anthonomus eugenii* Cano

Insect native from Central America, which nowadays has spread throughout the continent, representing an economic problem since it can cause damages of **up to 100% in chili cultivation**^[5]

Life cycle of the pepper weevil

The weevil is capable of generating 350 eggs during its life cycle. The biological cycle is classified in the egg period (3 to 5 days), then presents 3 larval stages (13-17 days), pupae (3-6 days), adult (2-4 days to emerge), to finish with mating.

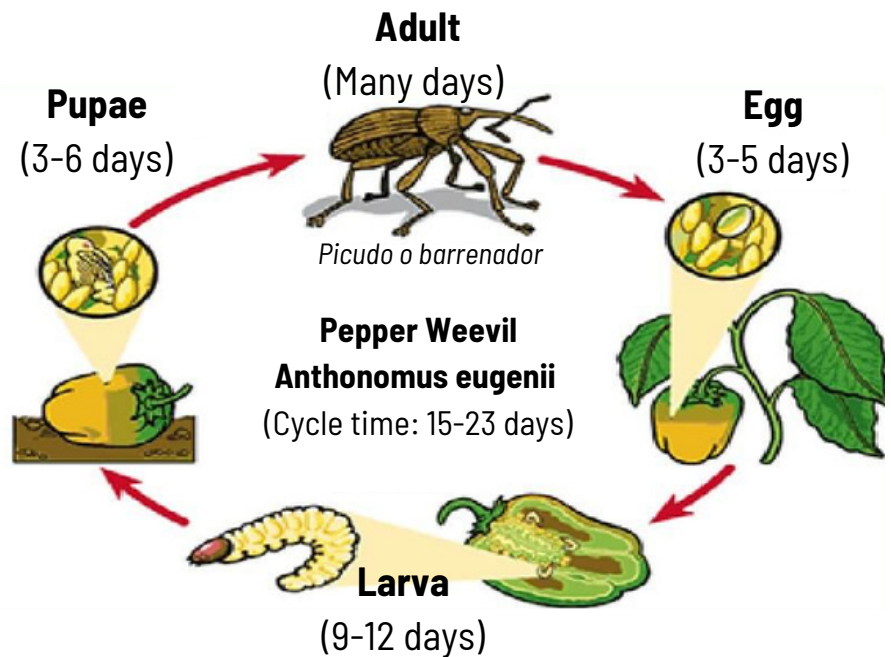
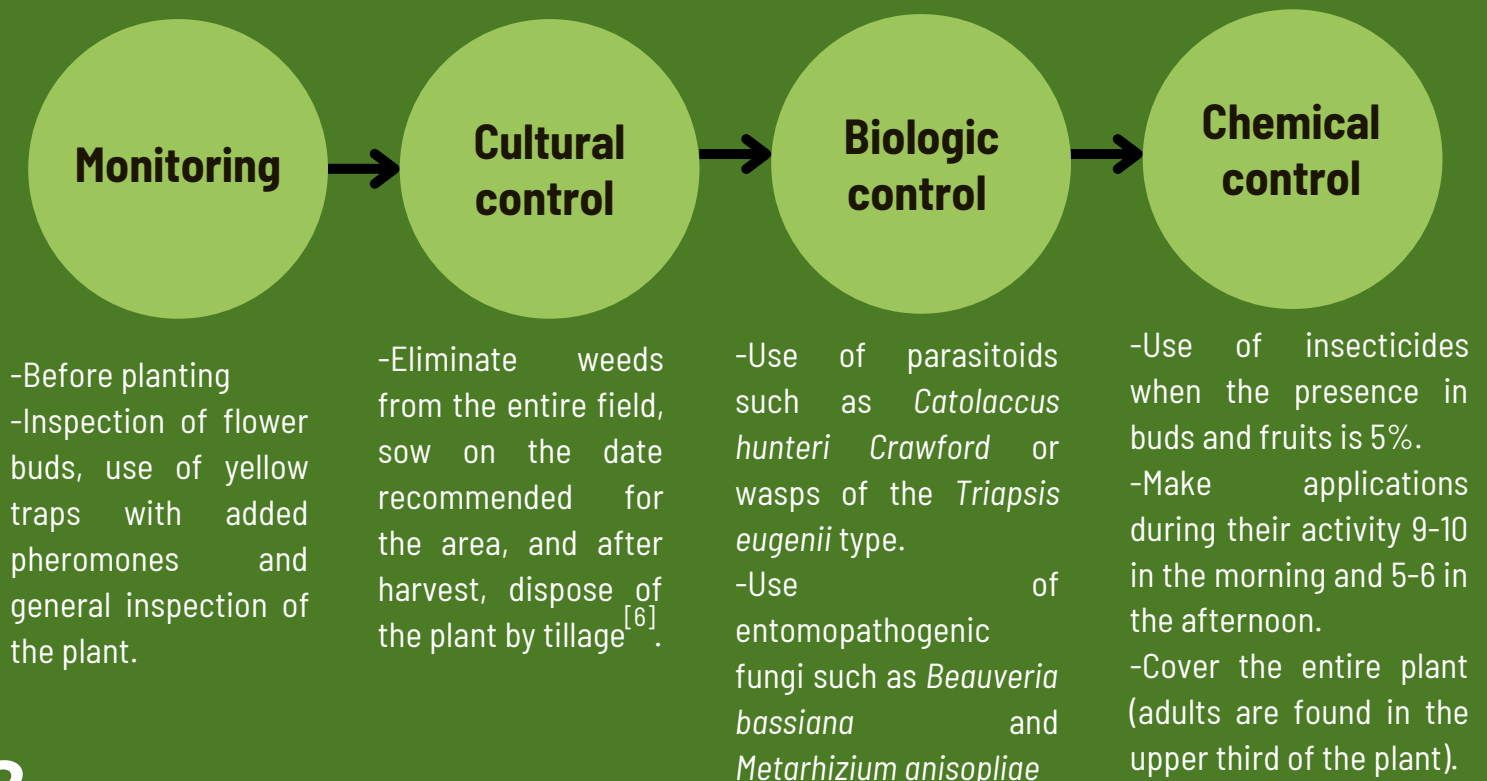


Figure 1. Biological cycle of the weevil^[6]

Integrated Management of the Chile Weevil



DAMPING – OFF

ALSO KNOWN AS DRYNESS

Damping-off is a common disease that affects all vegetable crops in the early stages of planting, on other words, during germination. There is no single pathogen responsible of it as it can be one or several microorganisms, but most are fungi and oomycetes^[7].

Rhizoctonia solani, *Thielaviopsis basicola*, *Pythium spp.* and *Phytophthora capsici* are the main microorganisms responsible for this condition. Expert evaluation is required to determine what is causing it, however, the symptoms and treatment are very similar to other plant diseases.

Symptoms

This disease symptoms fall into two main categories: symptoms that appear before the seeds can germinate and symptoms that appear after germination. During the first stage, seeds may not germinate and rot, or they may start to germinate (root) and rot before cotyledons appear^[8].



Figure 2. Damping off. Taken from Consejo Regulador I.G.P. Pimiento Asado del Bierzo

Prevention

- Plant the seeds in a nursery or field when conditions are best for their development. It depends on the species.
- Pay attention to the level of humidity in the seedbed or field, since soils that are too wet are more susceptible to this disease.
- Use the highest quality seed as it will be more vigorous and uniform.
- Buy pre-treated seeds.
- Ensure a good drainage system.
- When planting in a nursery or seedbed, ensure that the germination mix is pre-sterilized by the manufacturer.



¿WILT OR DAMPING OFF?

Damping off occurs in seedlings, that is, it is the phenomenon that occurs to plants in their youthful state. On the other hand, wilting occurs in mature plants^[9].

Both can be caused by the following microorganisms: *Phytophthora*, *Fusarium*, *Pythium* and *Rhizoctonia*^[10]. The symptoms are similar, although some differ by the stage in which the plant is^[9].

Table 1. Symptoms of Damping-off and wilting.

Damping off	Wilting
Losses of seeds, seedlings and young plants	Losses of mature plants and fruits
Leaf wilt, yellowing and curling	Leaf wilting and sometimes they fall off or get stuck
Roots do not develop properly and rot	The roots rot
Stem necrosis	Stem necrosis



Figure 3. Wilting of chili.

In the same way, the symptoms can change depending on the microorganism that is present in the soil^[10].



Figure 4. Fruit mummification due to wilting.

IMPORTANCE OF THE IRRIGATION SYSTEM

Crop rotation and the use of a technical irrigation system are alternatives that help control the appearance of diseases such as wilting or drying^[11]. There are several irrigation systems that have a certain efficiency, in table 2 you can see the most common.

The drip irrigation system is one of the most efficient systems since it avoids flooding and allows pouring the right amount of products such as fertilizers and water at the right time, reducing economic costs and without leaching into the mantles. It also prevents the development of diseases caused by fungi and oomycetes, since the level of humidity that is generated is lower than that caused by irrigation systems such as furrows^[12]. This prevents microorganisms such as *Phytophthora capsici* can be spread from one plant to the rest through irrigation^[11].

Table 2. Irrigation system

Irrigation system	Efficiency
Furrow	45%
Californian	65%
Aspersión	75%
Microsprinkler	85%
Drip	90%



Figure 5. Drip irrigation system through strip.

The use of irrigation methods with higher efficiency reduces direct evaporation from the soil and improves the microenvironment around the roots of the crop, which promotes better plant development and increases water productivity. Which takes great importance for arid regions such as the state of Chihuahua where the resource is scarce^[13].

CROP ROTATION

Growing only one or two types of plants on large tracts of land generates negative consequences for the soil, since it depletes its nutrients, leaving it weak and unable to support the good growth of plants, which means that synthetic fertilizers have to be added. It also creates new opportunities for pests and diseases that a landscape with greater biodiversity would normally suppress on its own, but due to monoculture, it provokes the need to apply more and stronger chemicals to eliminate them^[14].

In the case of chili, the monoculture system or successive planting of similar crops generates a predisposition for the crops to be invaded by pathogens, mainly omycetes such as *Phytophthora capsici*, which causes slight wilting of the plant and in three or four days it wilts completely^[15].



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