Ministry of Agriculture

FAO Project TCP/LEB/0169

The Cedar Web-Spinning Sawfly, *Cephalcia tannourinensis Chevin*

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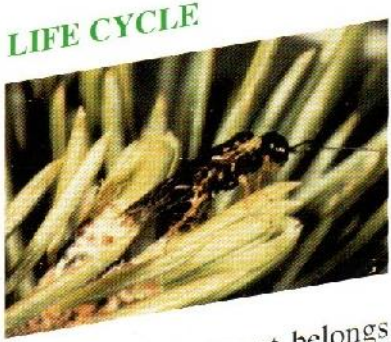
INTRODUCTION

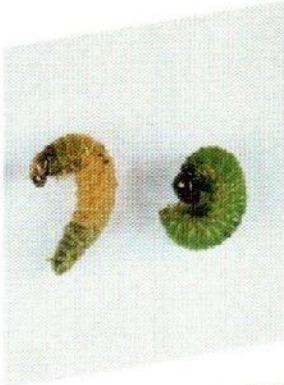
The cedar of Lebanon (*Cedrus libani* A.Rich) is found in 12 stands covering an area of approximately 1,700 hectares, representing 2.8% of the total forest area of Lebanon. The cedar forest of Tannourine-Haddath El-Jebbeh, located in northern Lebanon, encompasses about 600 hectares and is considered one of the largest cedar forests in the country.

The Cedar Web-Spinning Sawfly, *Cephalcia tannourinensis* Chevin, is a pest of Lebanese cedars that has caused severe damage in the Tannourine-Hadath El-Jebbeh forest in the last decade. The larva of the sawfly is a serious defoliator and attacks cedar stands at relatively high altitude (1700 m). Its presence and damage are dependant on climatic factors and specially temperature and humidity. Since 1990, the infestation has been increasing in intensity and has caused intense defoliation of trees over the whole area (600 hectares).

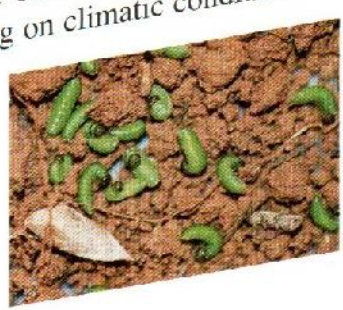
LIFE CYCLE



The wasp like insect belongs to the order Hymenoptera and the family Pamphiliidae. *Cephalcia tannourinensis* Chevin must have been present on the cedars of Tannourine-Hadath El-Jebbeh for several years before its damage started to intensify. The larvae were seen on the trees for the first time in 1996. Later, it was found that the larvae feed on the cedar needles for only one month, which explains the reason for the difficulty in detecting it. In 1998, identification of the insect started and a study of its life cycle was initiated.



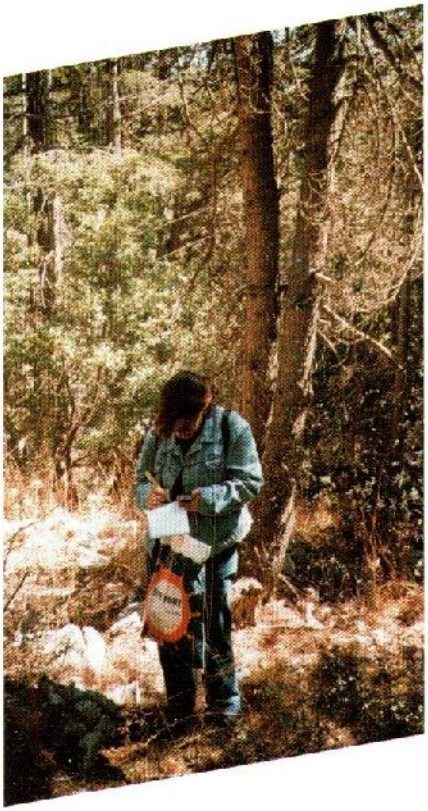
The adults swarm from mid April to mid-June. Females stick the eggs on the needles of a newly formed bud. Hatching is completed in two to four weeks. The larvae crawl into the bud bases and spin their webs. Feeding and development of the larvae lasts six to eight weeks, and the larvae pass through three instars. After the last molt, the larvae cease to spin, as a rule in late June until the end of July, drop to the ground and penetrate the mull, often to the boundary of mineral soil at a depth of 15-50 cm where they make a hole for hibernation. The end of diapause is indicated by a clarification of the larval eyes followed by the formation of large, dark and sharply delineated pupal eyes. The duration of pupation has not yet been determined and could extend for several years, depending on climatic conditions.

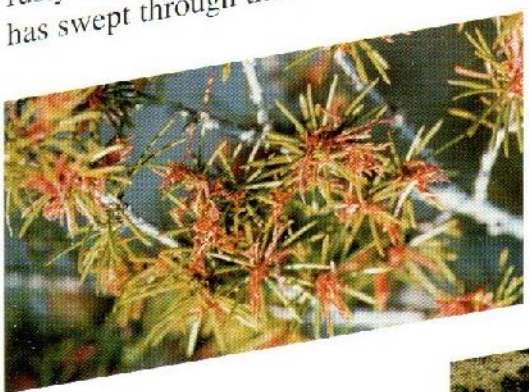


DAMAGE

Equipped with a high egg potential, one female can lay about 50 eggs on the new buds. As these buds open, the eggs hatch and the larvae start chewing on the needles. The first larval stage will chew only on the base of needles, while the second and third larval instars chew on the whole needle from its base until the top. Each larva will eat around 7 bud needles before it reaches maturity.

C. tannourinensis is an extremely voracious insects which can lead to the death of the trees. Attacked trees turn rusty-brown in color and look as if fire has swept through the forest.



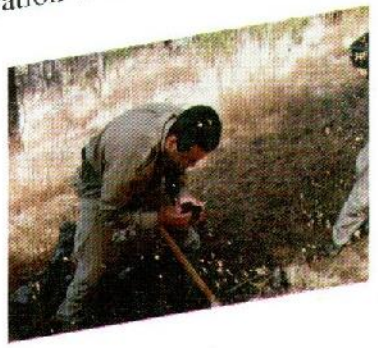


MONITORING OF *CEPHALCIA TANNOURINENSIS* POPULATION DENSITY

The levels of population dynamics of the web spinning sawflies, like other forest insect pests, have cyclic outbreak periods of more than three years, where the insects will be present in high numbers and their extent of damage becomes alarming on the geographic plan. *Cephalcia tannourinensis* has a unique strategy of attack particularly due to the type of needles it chooses to eat. It is a pest that attacks only new bud needles and will not feed on old ones. The outbreak fluctuations are governed by a number of factors capable of interfering with population multiplication and survival. The most important factors include the climate which is often responsible for changes in population level because of extremes in temperatures, precipitation and snow; natural enemies complex; and the quality of food and the presence of new buds at the time of adult emergence.

To monitor the population dynamics of *Cephalcia tannourinensis*, 30 permanent locations were chosen in the forest of Tannourine-Hadath El Jebbeh where monitoring has been carried each year using various methods. The first monitoring method utilized the traditional soil sampling of prepupae that was carried out after all the larvae have fallen. The procedure consisted of digging a soil area of 40 cm by 40 cm with a 40 cm depth and counting all prepuape of *Cephalia tannourinensis* present.
The second method consisted of placing funnel traps under the crown projection of the tree whereby the feeding excreta of the larvae were collected and weighed.

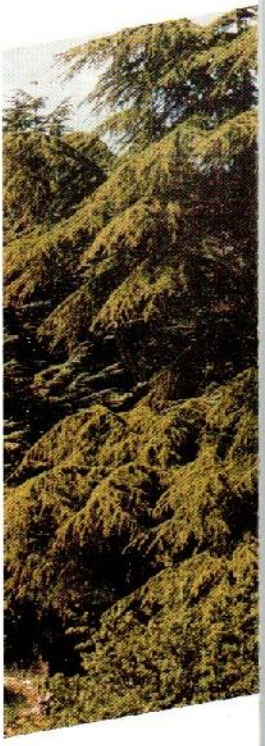
Specialized staff of the Rural Development and Natural Resources Directorate, Ministry of Agriculture, in collaboration with research institutes and universities are in charge of analyzing the collected data. The information gathered at the end of autumn on the population dynamics of the pest determines the control strategy during spring of the following year.



CONTROL

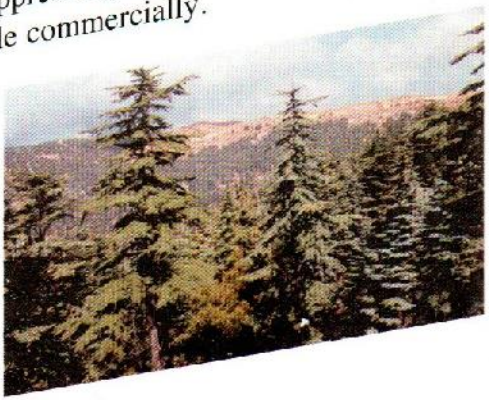
Control of forest insect pests is not essential and not advisable in all cases and should be limited to years of outbreaks. Hence thorough knowledge of the biology and life cycle of the pest is of primary importance before conducting any treatment. A treatment tactic cannot be viewed as an eradicative method that will prevent subsequent outbreaks but rather a means of protecting the susceptible forest from the ravages of the pest. The economic injury level of a pest may be considered as variable and dependent on the nature of the forest:

- In forest protection, treatment control is carried out when the trees are threatened because of the repeated defoliations over a number of years.
- In artificial stands (parks, recreation centers, etc...) accessible to public, the control decision is based on the aesthetic value of defoliated trees



Control methods can be applied either by ground equipment or aerial application, depending on the topography of the forested area or accessibility of the trees. In the case of the Tannourine-Hadath el Jebbeh cedar forest, the only practical spraying application was by aerial application using a helicopter equipped with ultra low volume (ULV) sprayers.

The use of broad-spectrum synthetic organic insecticides in forest ecosystems is not recommended due to their hazard to the natural balance and should be replaced by biorational pesticides, such as insect growth regulators (IGRs). An example of IGRs is diflubenzuron that belongs to the novel group of compounds, the benzoyl-phenylureas, which are considered selective and environmentally friendly. Diflubenzuron acts by interfering with the deposition of chitin, one of the main components of the insect cuticle. After treatment with diflubenzuron, the larvae have difficulty molting. Diflubenzuron is mainly a stomach poison and is not plant-systemic and does not penetrate the plant tissue. It has a high stability on plants and degrades rapidly in soil and water. Diflubenzuron was used in the control program of *Cephalcia tannourinensis* in four consecutive years and has been successful in suppressing the pest population. Other IGRs are availbale commercially.



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Protection of the Forests with Particular Emphasis on the New Pest *Cephalcia tannourinensis Infesting Lebanon Cedars.*

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