INSECT DAMAGE ON CONES AND SEEDS OF FOREST TREES IN TURKEY

by

Dr. Hasan ÇANAKÇIOĞLU

Faculty of Forestry, University of Istanbul, Turkey

INTRODUCTION

Insects destroying seeds of forest trees have important bearing upon forest production in Turkey as well as in other countries. Each year, forest fires, storms and snow drifts, overgrazing, insects and diseases cause tremendous damages in Turkish forests, and destroy thousands of hectares of forest lands. It has been even more important for Turkey, because of the shortage of productive forests. It is currently reported (ORMAN GENEL MÜDÜRLÜĞÜ, 1969) that, forests cover some 18,3 million hectares or 23.4 percent of the country's total land area. Only 7.4 million hectares or 9.5 percent of the total area is productive forest.

The natural reproduction of forests, and the artificial reforestation of denuded areas depend to a considerable extent, on the production of sound seeds. This is vitaly important in silviculture, and even more important for the national economy, because various seeds and nuts produced are widely used in Turkey, and exported to other countries.

Seeds, from their formation to maturity, are subject to various pests, especially injurious insects. In most instances insect damage to tree seeds is not severe enough to be of great importance; but in some seasons, however, insects destroy practically all the seeds of certain tree species in certain localities.

RESULTS

1. *Pissodes validirostris* Gyll., *Curculio (Balaninus) elephas* Gyll., *Curculio (Balaninus) nucum* L. and *Bradybatus creutzeri* Germ. of *Coleoptera* were recorded as the most important species damaging seeds.

Pissodes validirostris Gyll., attacked the cones of *Pinus nigra* var. *pallasiana* and *P. silvestris* and destroyed 20.0 percent of the cones in Bolu and 37.0 percent in Tavşanlı.

Nuts and acorns of *Castanea vesca* and *Quercus* spp. were infested by *Curculio (Balaninus) elephas* Gyll. In different localities of Turkey, the overall average damage were found to be 9.5 percent. On the other hand the extent of damage varies in different localities; for instance, the highest damage was found to be 20.5 percent in Balıkesir, 20.9 percent in Tavşanlı and 29.1 percent in Istanbul. In heavily infested areas, the average of 3 to 4 larvae were found in one acorn. However, the highest number of larvae was to be 8. The average damage on *Castanea vesca* nuts was about 15.5 percent in Belgrad Forest of Istanbul.

Curculio (Balaninus) nucum L., caused a great deal of damage in hazelnuts orchards in Black-Sea coasts. SCHIMITSCHEK (1944) reported that the weevil caused about 50.0 percent damage in Trabzon area in some years. However the recent studies (URAL, 1957) indicated that the average damage was about 40.0 percent which is still considered to be very severe. This means that 43,600 tons of hazelnuts are destroyed each year, which amounts to 29 million dollars in value.

The author found out that 100.0 percent of the seeds of *Acer campestre* have been destroyed by *Bradybatus creutzeri* Germ. in Düzce.

Apion holosericeum Gyll. infested 8.4 percent of *Carpinus betulus* seeds in Istanbul and Mudurnu. It was also found that 22.0 percent of *Pinus brutia* cones were killed by *Ernobius pini* var. *crassiusculus* Muls. in Istanbul.

The following species of *Coleoptera* were also observed as damaging insects: *Ernobius abietis* F. on *Cedrus libani, Ernobius angusticollis* Ratzbg. on *Cedrus libani* and *Pinus brutia* cones, *Bruchidius (Sparteus) villosus* F. on Spartium *junceum* seeds and *Curculio (Balaninus) glandium Marsh.* on *Corylus avellana* and *Quercus* spp. acorns.

2. In *Lepidoptera, Barbara osmana* Obr., *Carpocapsa (Laspeyresia) pomonella* var. *putaminana* Stgr., *Carpocapsa (Laspeyresia) reaumurana* Hein, *Dioryctria abietalla* Schiff. and *Dioryctria pineae* Stgr. are known as important destructive insects feed on seeds and cones.

The study indicated that *Barbara osmana* Obr. damaged *Cedrus libani* cones in Kaş and Bozdağ areas about 10.7 and 36.2 percent respectively. This injury even became more severe (41 percent) in some areas in Bozdağ.

Among *Lepidoptera* species *Carpocapsa (Laspeyresia) pomonella* var. *putaminana* Stgr. has been destructive on walnuts grown in Turkey. An initial study indicated that it damaged about 35.0 percent of walnut crops in Göy-

nük, Iznik and Istanbul area. This damage amounts to 12 million dolars in value which is equivalant to 29.000 tons of walnut crops out of total 83.000 tons of annual production.

In the same way *Carpocapsa (Laspeyresia) splendana* var. *reaumurana* Hein fed on oaks and chestnuts and destroyed about 14.8 percent of annual chestnut crops around Istanbul.

Dioryctria ebietella Schiff. causing damages on *Abies bornmülleriana, A. nordmanniana, A. cilicica, A. equi trojani, Picea orientalis, Pinus brutia, P. nigra* var. *pallasiana* and *Picea excelsa* cones has killed about entire cone crops (100.0 percent) of *Picea orientalis* grown in Trabzon area of Black - Sea coast in some years when the cone production was short. The damages on *Abies bornmülleriana* and *A. equi trojani* cones were 67.5 and 53.5 percent in Bursa and Edremit areas respectively. The same study indicated that the percentage of damage varied according to the location of trees within the forest stands. For instance, the trees growing at the edge of stands were subjected to cone damage at the rate of 85.0 percent, whereas the trees located within the forest stands suffered from 50.0 percent lost by the insect damage.

Pinus pinea cones in Bergama - Kozak and Aydın - Mazon forests were infested by *Dioryctria pineae* Stgr. The damage was about 6.0 percent of the annual crop production.

In the other hand *Pinus silvestris, P. strobus* and *P. excelsa* grown in various parks of Istanbul were attacked by *Evetria (Gravitarmata) retiferana* Week. The annual lost of total cone crops caused by the insect was about 57.5 percent. *Evetria tessulatana* Stgr. of the same family also has killed about 52.5 percent of the annual cone crops of *Cupressus sempervirens* at the vicinity of Istanbul.

The following insects have caused varying degrees of damages to cones of various trees grow at different localities. For instance, *Argyresthie praecocella* Zell. on *Juniperus excelsa* and *Cupressus sempervirens; Evetria margarotana* HS. on *Abies nordmanniana; Laspeyresia conicolana* Heyl. on *Pinus nigra* var. *pallasiana, P. brutia* and *P. nigra* var. *pyramidalis; Laspeyresia strobilella* L. on *Picea excelsa; Pammene pontica* Obr. on *Juniperus excelsa; Dioryctria mendacella* Stgr. on *Pinus brutia* and *P. halepensis* cones; *Carpocapsa (Laspeyresia) grossana* Hw. on *Fagus orientalis; Etiella zinckenella* Tr. on *Robinia pseudoacacia* seeds; and *Carpocapsa (Laspeyresia) amplana* Hb. on *Quercus pedunculata* and *Q. rubra* acorns were observed.

3 *Megastigmus* species of *Hymenoptera* is specifically worth to mention. *Megastigmus bornmülleriana* Hussey has killed about 27.0 percent of the

total annual *Abies bornmülleriana* seeds in Göynük.

On the other hand *Megastigmus schimitscheki* Nozitzky on *Cedrus libani*, and *Megastigmus wachtli* Seitner on *Cupressus sempervirens* seeds; *Torymus azureus* Boh. on *Picea orientalis* cones caused severe damages.

Cynips mayri Kieff., *C. caput medusae* Hartig, *C. calicis* Burgsdf. and *Aphilotrix (Andricus) seckendorffi* Wachtl of *Cynipidae* family are also known to cause abnormal formations on oak acorns.

4. *Rhagoletis flavigenualis* Hering and *Hapleginella laevifrons* Loew. of *Diptera* have been found to feed on *Juniperus excelsa* and *Abies nordmanniana* cones respectively.

5. Similarly *Eriophyes triradiatus* Nal. and *E. fraxini* Nal. of *Acarina* have caused severe damages to *Salix babylonica* and *Fraxinus* spp. flowers.

DISCUSSION

It is apparent from the results submitted above that the extent of damage caused by various insects to seeds and cones of some important commercial tree species should not be overlooked. However, overall average of the damages on seeds and cones of commercial trees caused by various insects was found to be 32. 3 percent of the annual seed crops. This figure proves that the extent of damage can and should be reduced to an acceptable level by an effective insect control programme specifically giving our attention upon some important areas such as seed orchards. It is also believed that a good seed control program should be initiated during the collection of cones and seeds and before their storage. Otherwise infected seeds and cones may spread the diseases to uninfested areas adjacent to new plantations. The control program will prevent or reduce the losts in seed production.

TÜRKÇE ÖZET

TÜRKİYE'DE ORMAN AĞAÇLARININ TOHUM VE KOZALAKLARINA ÂRIZ OLAN BÖCEKLER

Çeşitli sebeplerle her yıl binlerce hektar orman sahasının tahrip olduğu Türkiye'de, gerek açılmış gerekse orman içi ve orman dışı boş olanların sun'i veya tabii yollarla gençleştirilmesi büyük miktarda sağlam tohumun mevcudiyetine bağlıdır. Orman ağaçlarının tohumları ise, teşekküllerinden olgunlaşmalarına kadar çeşitli zararlıların ve hassaten böceklerin tahribatına maruz kalmaktadırlar.

Yapılan çalışmalar sonunda Türkiye'de önemli zarar yapan tohum böcekleri ve tahribat yüzdeleri aşağıda verilmiştir.

1. *Coleoptera* takımı: Çam kozalakları tahripçisi *Pissodes validirostris* Gyll.'nin Bolu mıntıkasında % 20.0 ve Tavşanlı havalisinde % 37.0 zarar yaptığı tesbit edilmiştir. *Curculio (Balalinus) elephas* Gyll.'ın Türkiye'nin çeşitli mıntakalarında meşe ve kestane meyvalarındaki zarar ortalaması % 9.5'dur. Fakat bu oran, meselâ, Balıkesir mıntıkasındaki meşelerde % 20.5, Tavşanlı havalisindeki meşelerde ise % 29.1 ve Istanbul - Belgrad ormanındaki kestanelerde % 15.5 olarak tesbit edilmiştir. *Curculio (Balaninus) nucum* L.'un Karadeniz mıntakasında fındık mahsulündeki zararının % 50.0 (SCHIMITSCHEK, 1944) ve % 40.0 (URAL, 1957) olduğu bildirilmektedir. Ayrıca *Bradybatus creutzeri* Germ.'in *Acer campestre* tohumlarında Düzce mıntakasında % 100.0; *Apion holosericeum* Gyll.'un Istanbul ve Mudurnu havalisindeki gürgen tohumlarında % 8.4 ve *Ernobius pini* var. *crassiusculus* Muls.'un İstanbul mıntakasındaki kızılçamlarda % 22.0 oranında zarar yaptığı tesbit edilmiştir.

2. *Lepidoptera* takımı: Bu takımdan *Barbara osmana* Obr.'nın Kaş havalisindeki sedir kozalaklarında % 10.7 ve Bozdağ'da % 36.2 - 41.0 hasar yaptığı anlaşılmıştır. *Carpocapsa (Laspeyresia) pomonella* var. *putaminana* Stgr.'nın Göynük, İznik ve Istanbul havalisindeki cevizlerde % 35.0; *Carpocapsa (Laspeyresia) splendana* var. *reaumurana* Hein'nın Istanbul mıntakasındaki kestanelerde % 14.8; *Dioryctria abietella* Schiff.'nın Türkiye'nin çeşitli mıntıkalarındaki göknar, lâdin ve çam kozalaklarında % 50.0 - 100.0; *Dioryctria*

pineae Stgr.'nın Bergama - Kozak ve Aydın - Mazon fıstıkçamı ormanlarında % 6.0; *Evetria (Gravitarmata) retiferana* Wck.'nın Istanbul mıntakasındaki çamlarda % 57.7 ve *Evetria tessulatana* Stgr.'nın yine İstanbul havalisindeki servi tohumlarında % 52.5 oranında zarar yaptıkları tesbit edilmiştir.

3. *Hymenoptera* takımı : Bilhassa çeşitli *Megastigmus* türlerinin zararı zikre değer. Bunlardan *Megastigmus bornmülleriana* Hussey'nın Göynük mıntakasındaki göknar tohumlarında % 27.0, Yenice havalisinde % 40.0 ve Bolu mıntakasında % 75.0 oranında hasar yaptığı hesaplanmıştır.

Yukarıda adı geçen üç takıma mensup diğer böceklerle *Diptera* ve *Acarina* takımlarına dahil tohum böceklerinin Türkiye ormanlarındaki tahribatları neticesi her sene tohum mahsulünün ortalama % 32.3 miktarının tahrip edildiği tesbit edilmiştir. Bu yüzdenin fazlalığı nazarı itibare alınarak, şimdilik hiç olmazsa tohum bahçelerinde ve tohum meşcerelerinde bu böceklerle mücadele zarureti vardır.

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