Reverse effect of insects in fruit setting of almond trees (prunus amygdius) in Turkey

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RESUME-ABSTRACT

The reverse effect of insects in fruit set may be an important limiting factor of the productivity of almond trees.
It is shown in this paper that the attack of insects to flowers and buds may significantly increase the incidence of unsetting the fruits.
The type of injury caused by different insect species in Turkey is discussed by the author.

Une production de fruits insuffisante peut avoir pour origine, en Turquie, des attaques sur les fleurs, d'insectes divers qui se nourrissent des organes floraux. Certains sont visibles comme les Scarabeidés, les Tordeuses, les Pucerons, les trips. Les charançons sont les insectes les plus dangereux.
Certains se développent dans les fleurs comme les Cecidomies et les anthonomes; ces derniers pouvant faire de véritables ravages.

INTRODUCTION

Almond is one of those fruit crops whose culture and oil seem to be known, since the early neolitic settlements in Anatolia, in the years between the period from 6.500 to 5.650 B.C. (Mellaart, 1965). Today it is still an important fruit tree, largely grown nearly all over Turkey, with numerous varieties (including cultivated and wild forms).

It is one of the fruit trees setting earliest fruit among the genus of *Prunus.* However, for several reasons a considerable number of flowers or buds cannot maintain their development in setting up fruits. For example, one can see an almond tree at the end of winter or in early springtime with plenty of flowers, and sometimes few fruits remain to be seen on it later on. This proporcionally less fruit setting is usually atributed to several factors. Most growers and plant breeders generally believe that climatic conditions such as dry, desiccating winds, or heavy rains and frost during flowering period are associated with poor fruit setting, besides the physiological factors.

This is true, but despite these factors some insects may, sometimes, play again an important role in them; therefore one must keep this in mind. Such insect species are here presented and discussed.

SPECIES INVOLVED

Since the flower's food supply (pollen, nectar, et-cetera) attracts insects toward flowers, and being, thus, the colour of the flowers an attractive factor, a vast number of insects are really useful as well as invaluable pollinating agents (here excluded); others are, notwithstanding, rather destructive type agents due to their behavior in eating from flowers their most essential organs. Insects that attack the non-essential parts of a flower (calyx, sepal) are less dangerous than those attacking the essential parts (stamens, anthers, styles, ovaries). These organs are directly concerned with fertilization and fruit formation.

Therefore, the fact that insects which attack fruit blossoms or buds are, either responsible for, or indirectly concerned with crop production, should not be underestimated. In this respect, the harmful insects may be considered under two categories: a) exposed, b) concealed pests.

1. Exposed pests.

This group consists of a set of various insect species whose active feeding stage occurs entirely in the open, and their damage can be easily seen. For example, speciesm such as the *Tropinata* (=Epicometis) *hirta* poda, *T. squalida* Scop., *Oxythrea cinctella* Schaum and *O. funesta* Poda (Col., Scarabaeidae) are well known as injurious species to flowers. They are easily seen on flowers devouring their essential parts, especially those of the late varieties. If the pest population is large enough, they can sometimes even cause, considerable damage. The 1st and 3rd species are far more important than the others, and are largely distributed in this country. Since they are quite large insects, one can easily see them and detect their damage upon flowers. Damage caused by them on almonds is not important.

Some species, *Operopthera* and *Archips* (Lep. Tortricidae) whose larvae, though normal foliage feeders may, sometimes also, and to some extent, cause dammage on flowers and buds. However, the most important species of Lepidoptera in this respect is *Recurvaria nanella* Hbn. whose larvae may sometimes destroy about 30-40 % of the almond's buds in some parts of Southeastern Anatolia.

Aphids (Hom., Aphididae) are also responsible for a considerable amount of damage in flowers. Among the most important flower invading species there is the *Brachycaudus helichrysi* Kalt. Attacked flowers wither and die. If there is enough population it may cause extensive damage to the flowers.

Some thrips species may be mentioned also in this group. Since they are minute insects one cannot see them or not pay attention to them. There are some flower infesting species such as *Thrips tabaci* Lind., T. flavus Schrk. and *Taeniothrips inconsequens* Uzel (all of them belong to the Thripidae family-Thysanoptera) that may occasionally cause damage to the flowers of almond trees in addition of other plants. These species may cause discolouration to the flowers, but their damage is negligible.

Capsid bugs, such as *Lygus pabulinus* L. *and Calocoris norvegicus* Gmel. (Het., Miridae), are concerned in petal distortion and flower dropping when feeding from them. However, they are seldom seen on the late varieties of almonds and their damage on this subject is not important.

Among the exposed pests of almond blossoms or buds, some species of Attelabidae (Coleoptera) are particulary important for some regions of Turkey. The more weighty species are *Rhynchites baccnus* L, *R. smyrnensis* Desbr. *and Coenorrhynchus aequatus* L., of these, the last one is the most important. Adults feed on the buds or on the calyx of flowers, especially the late varieties; also from fruits and young leaves thus causing considerable damage. Adults appear in March or early April according to the place or the climatic conditions. In the first appearance they feed from the buds before they are opened. Attacked buds became sterile, as they are perforated with the rostrum right into the ovaries. Adults also feed from the calyx and from the flower's pendule, which as a result, may spoil the fruit or force flowers into dropping. Later on insects continue to feed on the small fruits which cause them to wilt and drop prematurely (which is not being considered here). Damage to buds and flowers can reach up to 40 %, according to the place, year and the varieties of the almond tree.

2. Concealed pests.

The insects in this group have a concealed way of life throughout the larval stage and its damage cannot be easily detected either. Most flower-destructive species occur in this category.

Almond bud midge, *Odipodiplosis amygdali* Anag. (Dip., Cecidomyiidae) is known to attack almond and wild peach trees in some countries of the Near East. Attacked buds cannot develop normally and, become a sort of flowering organ in which the larvae feed. It is a somewhat important pest in some areas of southern Anatolia. In general its damage is negligible.

Blossom weevils such as *Anthonomus amygdali* Hust., *A. rubripes* Gyll. v. *femoratus* Desbr., *A. baudie-*

ri Desbr. and *A. variabilis* Hoffm. are serious pests to almond trees in Turkey. Most growers and even some entomologists ignore their damage. Actually, in some areas and some years, some of these species cause extensive damage to flowers. The first 3 species sometimes co-exist together (sympatric) in the same area; as it happens in some districts of the Southeastern part of Turkey. Generally, the eggs are laid in the blossom buds and the larvae feed and pupate inside the buds. Such attacked buds open, but their petals turn brown producing a "capped" blossom. This cannot easily be noticed among other blossoms, hence the attacked buds fail to produce any fruit. Since these species are very important, additional information is provided, further on, for each respective species.

Anthonomus amygdali Hust.

Syn. *A. ornatus* Reiche, *A. multifasciatus* Pic.

In Turkey among the blossom weevils that attack almond trees this one, is by far the most important. It is found almost all over the country. However, it is also found more frecuently in the West, Middle and South East of Anatolia where it causes considerable damage. Its main host plant in Turkey is the almond. Adults appear early in springtime, before the opening of the blossom. In this period the adult feeds on the buds and such buds become sterile, as happens with *C. aequatus* and *R. bacchus.* This sort of injury is not very important, because adults start feeding on the young leaves as soon as they come out. Therefore, the main injury is done by the larvae. In some parts of Middle and Western Anatolia it causes as much as 80 % injury to the flowers. In some parts of the South east of Turkey its damage seems quite serious, too.

Anthonomus rubripes Gyll. V. *femoratus* Desbr. syn. *A. gentilis* Fst.

This variety was synonymized as *A. gentilis* by Dieckmann (1968). There is not much information about the biology of the nominal form except that of Angelov (1966) who determined the *Potentilla argentea* L. (Rosaceae) as a host plant in the Rhodope area (Bulgaria). However, Lodos (1961-1978) named the host plant as *Prunus amygdalus* for *V. femoratus.* Recent studies revealed that this variety, largely distributed in the Southestern part of Turkey is quite injurious to almonds. Its biology is not exactly known in Turkey. Furthemore, some taxonomic work must be exercised in order to clear up whether this could be a variety or a valid species.

Anthonomus baudieri Desbr.

Syn. *A. ornatoides* Reitt., *A. cyprius* Marsh.

This species is distributed among the Middle and Southeastern regions of Turkey. Especially in some parts of the latter region, it causes sometimes extensive damage to almonds, together with one or two previous species. In Turkey it is particulary injurious, to almonds, though it is also known tobe a peach pest in Lebanon (Talhouk, 1969). Its biology and damage is similar to that of the *A. amygdali.*

Anthonomus variabilis Hoffm.

Among these species, the almond is also a host plant. In Turkey, it is Ocasionally found in almond trees, but the damage produced in said plant is negligible.

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