The More Important Injurious Pests of Citrus, Stone Fruits, and Grapes in Arab Countries and Means of Reducing Their Injury

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Abstract

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The favourable climate in most Arab countries for the growth of fruits resulted in the creation of extensive monocultures of citrus, stone fruits and grapes whose fruits are consumed fresh, canned or exported. As a consequence, phytophagous insects of the said fruits found favourable micro-climates and biotopes that helped them reach pest status. Biological information relative to management of the phytophaga in order to reduce their damage was given.

I. Introduction

The application of integrated pest management (IPM) to orchards and vineyards can only succeed where the correct information related to the following are available: (1) the physiological requirements of the plants to be protected (2) the identity of the local phytophagous species (3) the phenology of both of the plants and their enemies (4) elements of ecology, because agriculture is a true «jig-saw puzzle».

The ordinary farmer, even in the advanced countries, needs quite a bit of «tutoring» along these lines by the agricultural extension agents, or by following vocational agricultural courses in specialized institutions. Of course, farmers in the developing countries need at least as much «tutoring» along the same line. Only when adequate agricultural extension services are available to the farmers, is there a hope that IPM can be successfully applied. College and vocational agricultural schools should be established or increased in developing countries in order to spread acquired knowledge resulting from local research.

True knowledge of the existence of local pests depends on the collecting and proper identification of all arthropods in the country, more or less along the pattern of what is already done in the Fauna of Saudi Arabia, and, to a lesser degree, in Oman, Kuwait, Egypt and Iraq. The faunas of adjacent countries are not necessarily identical. The application of the proper pesticides to control a pest is very likely to fail if the timing of the application is incorrect.

Although foreign text books on pest control are basically very helpful in principle, less than three percent of the agricultural pests of USA, and less than 12 percent of those in West European countries exist in the Middle East.

In integrated pest management, a number of facts have to be considered in order to attain satisfactory results. For every plant species, there are arthopods that feed on it whose optimal requirement are vigorous hosts and are best exemplified by the sternorhynchous homoptera; on the other hand, there are the xylophagous insects whose optimal larval requirements are weak woody stands in which they can bore their tunnels without resistance on the parts of a (weak) wood. Finally, a number of other plant feeders are less choosy, and can adapt to their host plants practically as long as the latter are alive; the majority of chewing insects, with some variation, fall into this category. Although plants can tolerate a level of loss in vigour for a short time without appreciable suffering, a continuous drain on vigour by the sucking insects or by the defoliators, will render a woody plant subject to the attack of all sorts of borers, and will lead to its death. With this in mind one sees the importance of providing the plants with the optimum conditions that guarantee their vigour. Amongst the meant conditions for any plant variety are: (1) planting in a suitable soil, (2) planting in a suitable climate, (3) providing proper nutrition, (4) providing adequate irrigation and drainage whenever needed, and (5) practicing other genetal management operation, and care. The fulfilment of the above conditions are an act of «vaccination» against the collapse of an attacked plant. A second safety factor which has a great survival value to the plants is the protection of natural enemies of its phytophaga, including birds, arthopods, and pathogens that gradually arrive to settled environments, such as orchards, woods, and forests. However, since phytophagus arthropods arrive to newly planted orchards a considerable time before their natural enemies (Volterra's Third Law), it is often necessary to use pesticides when phytophagous populations start to endager their host plants. When such necessity becomes unavoidable, the use of selective pesticides, in spite of their high prices, is the only long term advisable resort. Although the contact or general purpose pesticides are cheaper and may show immediate, spectacular results following their application, after a (variable) short time, the population of the phytophagous target will increase very rapidly to exceed remarkably its former numbers, what is termed in pest man-

agement vernacular «resurgence». The result is further and repeated application of the pesticide at shorter and shorter intervals, and the development of resistance by the repeated elimination of the weaker individuals in the treated population. In mature orchards, the use of contact pesticides has another added danger to the one mentioned; since it kills a proportionately higher number of predators and of the delicate and highly susceptible, tiny parasites.

With time, a mature orchard treated with proper, selective pesticides, will form a stable ecosystem in which the trees, the phytophagous arthropod populations and those of their natural enemies live together in more or less proportioned populations, termed «natural balance». When the balance is disrupted due to unusual conditions or to faulty management operations that favour a threatening increase of the phytophagous populations, resort to selective pesticides becomes necessary.

II. Pests of Citrus

These can best be divided into, (1) pests of vegetative organs, (2) pests of reproductive organs, and (3) vectors of plant diseases.

1. Pests of vegetative organs often attack also the reproductive organs, but not vice versa. Among the most important are the Homoptera, and the Acarina, many of which have a cosmopolitan distribution. The commonest ones in the Near and Middle East are: (a) Homoptera, including *Aonidiella aurantii, Lepidosaphes* spp., *Saissetia oleae, Planococcus citri, Dialeurodes citri, Coccus hesperidum, Icerya purchasi, Aphis gossypii, Toxoptera aurantii, Diaphorina citri.* (b) Acari, including *Bryobia praetiosa, Panonychus citri, Phyllocoptruta oleivora.*

2. Pests of reproductive organs. (a) Diptera, *Ceratitis capitata, Dacus zonatus* (b) Lepidoptera, *Prays citri, phyllocnistis citrella, Cryptoblabes gnidiella;* Acari, *Aceria sheldoni, Phyllocoptruta oleivora.*
3. Vectors of plant diseases. Homoptera, *Aphis gossypii, Aphis craccivora, Diaphorina citri.*

The following are recommendation for the integrated pest management in citrus groves:

a. Against hard scales; winter oils,
b. Against soft scales; systemic poisons when insects are active; also lime-sulfur at dormant concentration,
c. Against fruit flies; pheromones and chemosterilants when the fruit starts to mature (change color from green to yellow).
d. Against acarina; acaricides, lime-sulfur, whenever the red spiders or mites are present.

III. Pests of Grapes

Grapes are generally grown in three different ways on an extensive scale in the Middle East. The ways, or methods, have an influence on species that attack the vines, as well as the level of injury they cause. The three methods in general use are:

1. Prostrate growth on the ground all around the year, except the use of props when berries are formed, so as to prevent mechanical injury to the bunches.
2. Growing the vines (as cordons) on horizontally-stretched metallic wires in an east-west direction.
3. Growing the vines on raised trellises ca. two meters high.

The first method was very suitable for ploughing when ox ploughs were common,and isnow rapidly loosing ground due to abandonment of ox ploughing. In this type of vineyards, the only pest was the phylloxera, and to a very minor degree, wasps and hornets. No fungus diseases were of any significance, because grapes were only grown in rain-fed areas without supplementary irrigations.

The second method or cordon growing is the least conducive to pest or fungus attacks, due to the non suitable drying action of the sun and wind on the said organisms.

The third method of growing grapes is very conducive to the spread of pests and diseases, due to the appreciable rise in humidity underneath the vines, and the prevention of sunlight from reaching the soil or the fruit. Unfortunately, the method has become «fashionable» and expensive for the grower and the consumer. Now that practically all vines are grafted on American stalks, phylloxera is no more a problem in all vineyards.

However, in the vines grown on trellises, the following pests have to be controlled. The grape berry moth, *Lobesia botrana,* the mealybug,*Planococcus citri,* and the fungi causing powdery mildew, and downy mildew, *Chloropsalta viridissima* in North Syria. To control the insect, it is recommended to cut and burn the twigs where egg-laying scars occur, before the eggs hatch in August.

The grape berry moth is controlled by sprays of *Bacillus thuringiensis* starting about end to mid April. The spray should be repeated after 20 - 25 days, and is safe since this *bacillus* is very selective against lepidopterous larvae. *Planococcus citri* is controllable with lime-sulfur sprays in winter, and systemic organo-phosphates when the insect is actively feeding, i.e. when the insects excrete honey dew. As to the powdery and downy mildews a number of synthetic fungicides have replaced sulfur and copper salt sprays.

IV. Pests of Stone Fruit Trees

The woody organs of all stone fruits suffer from the attack of boring grubs, particularly when the trees are not irrigated during the hot summer months, or are rendered weak by other means. There is a general tendency by the fruit growers to neglect or totally ignore the fruit-thinning operation, no matter how heavy fruit set is. This mistake results in small fruits, with a low sugar content, and a progressive weakness of the tree, year after year, thus exposing the roots and trunks to the attack of a number of borers. Irrigation, fruit-thinning, pruning, and proper nutrition are the most important management practices that guarantee a long, profitable life of stone fruit trees. There is a number of pests of stone fruit trees that are common to all species. These are the (1) Coleoptera, *Capnodis* spp.; *Cerambyx dux.;* and *Scolytus* spp. (2) Hymenoptera , *Pterochloroides persicae,* and

different leaf-infesting aphids.

The pests that attack the fruits are to a great extent species-specific. (3) the Diptera, *Ceratitis capitata* is most serious to peach and apricot fruits, and *Odinadiplosis amygdali* on almond buds. (4) the Hymenoptera are represented by *Hoplocampa flava,* and *H. minuta* on Japanese prunes, and *Eurytoma amygdali* on almonds. (5) the Coleoptera are represented only by one fruit pest of apricots *Rhynchites auratus* in Syria and the Baalbak-Hirmel area in Lebanon. (6) Acari, *Acalitus phloeocoptes* on almond buds; tetranychids on the leaves of most or all stone fruits. (7) Homoptera, *Brachycaudus amygdalinus* and *B. helichrysi* on the leaves of almonds, and *Hyalopterus pruni* on the leaves of plums, prunes and apricots.

Control of *Ceratitis* is best achieved by the use of attractant baits to which a chemosterilant is added; the application time starts when the colour of fruits begins to change from green to yellow. Treatment has to be continued as long as the fruit is on the tree.

The control of the almond bud midge, *Odinadiplosis* is best achieved by planting late almond varieties, because such varieties escape attack by this pest. Early varieties subject to attack by this midge should have the live galls pruned and burnt before mid-January. The use of systemic organophosphates soon after the average length of leaves on the trees reach five millimeters, help kill many neonete larvae.

Hoplocampa flava and *H. minuta* are univoltine. They lay their eggs in the very young ovaries of plum and prune trees, and to a lesser extent in cherry flowers. When the eggs hatch, the larvae head towards the newly formed seeds and devour them. In the course of their development after devouring the seeds in one fruit, the larva leaves the attacked fruit and attacks a second one. For its complete development of the larval stage of *Hoplocampa* will need to infest four or five fruits. This pest is controlled by one spray application of systemic organo-phospate insecticide, which has to be applied right after petal fall.

Eurytoma amygdali is also an univoltine species, whose female introduces its ovipositor in very young almond fruits, and lay one egg on the young seed. When the egg hatches, the larva starts feeding on the gelatinous seed at that time. Larval development is comparatively slow, so that when the larva reaches its full-growth, the rest of the seed would have hardened in June. This pest is also very vulnerable to systemic organophosphates, if applied to almond trees when the majority of the set fruits have reached the size of a dry chickpea.

Rhynchites aurantus is also univoltine, but much more difficult to control, due to extended time of appearance of adults in spring. The adult female bores with its mouth parts the surface of a young apricot or cherry fruit, and lay one egg in the hole. When the egg hatches, the larva heads towards the young seed, before the endocarp hardens, and feeds on the very soft, gelatinous seed. Systemic organo-phosphates also kill this larva, however, two applications at one week's interval have to be applied; the first, a week after most petals have fallen.

Acalitus phloeocoptes in Lebanon and Syria does not represent a problem any more, because it has killed practically all susceptible almond varieties in its habitat. Here, too, one organo-phosphate application when very young leaves develop on the almond tree will guarantee mite-free buds the following spring.

Aphid species that attack the stone fruit leaves rarely require any treatment, because of the large number of natural enemies that prey on them. In case they are not reduced by their enemies carbamate aphicides or systemic *insecticides* are the best weapons against them.

الملخص

تلحوق،عبد المنعم. 1989. أهم الآفات الضارة التي تصيب أشجار الحمضيات، واللوزيات والكرمة في الدول العربية ووسائل الحد من أضرارها. مجلة وقاية النبات العربية 7: 200 - 198.

ان المناخ الملائم في معظم الدول العربية لنمو أشجار الفاكهة أدى إلى نشوء مزارع واسعة متخصصة كبيارات الحمضيات وبساتين اللوزيات، وكروم العنب، وحيث تستهلك ثمار هذه الأشجار طازجة أو معلبة، أو تصدر لخارج البلاد. وكنتيجة لهذا الوضع تجد الحشرات التي تصيب هذه الثمار مناخاً موضعياً ملائماً يسمح لها بالوصول إلى حالة الآفة. وقد أعطى المحاضر معلومات حيوية تخص إدارة آكلات النبات هذه بغية الاقلال من أضرارها.

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