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Varietal susceptibility of pear trees in Israel to attack by Aphanostigma piri Chol.  
(Aphidoidea: Phylloxeridae) \*

by

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ABSTRACT

Of the three common pear varieties grown in Israel, the fruit of the Spadona variety is the most susceptible to attack by Aphanostigma piri, the Gentil suffers much less, and Coscia is seldom infested. The Spadona variety is also much more susceptible than the Gentil and Coscia to infestation of the bark and bark crevices. The buds of these three varieties are not susceptible, whereas aphids penetrate the buds of the Superfine variety and destroy them.

INTRODUCTION

Aphanostigma piri reproduces parthenogenetically throughout the year in Israel, laying its eggs in bark crevices. However, with the marked increase in population during the autumn the aphid inhabits the bark of the trunk, branches and spurs. The aphids are responsible for cracking of the bark of pear trees (Fig. 1, 2, 3, 4) which may result in the death of affected branches (10). Aphids also penetrate and destroy the buds (Fig. 11) (9, 10),

Fruits covered with bags have been attacked by Aphanostigma in the Crimea (2), and in Japan by a related species - Cinacium iakusuiense Kishida (12); but in 1963 uncovered fruit was reported to be severely attacked in France (4, 5, 6), and in 1967 this phenomenon was noted also in Israel (Fig. 5). Since then, Aphanostigma piri has become a major pest of pear trees in Israel.

Variations have been found in the resistance of different varieties to attack of the buds and the bark (3, 10). A study was therefore started in 1968 of the resistance of fruit of different varieties in the northern part of Israel. The data from an earlier survey of the pest, on tree trunks and branches, which was carried out in the Coastal Plain, the Valley of Jezre'el the Hula Valley and Upper Galilee during 1949-1966, and which have been published in Hebrew only are also presented herein.

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Table 2

Infestation in the crevices of bark of pear trees in the Hula area and in the Upper Galilee, 1965-66 (3).

Variety	Number of trees examined	% of infested trees	% of infested units under bark					
			trunk			large branches		
			1	2	3	1	2	3
Spadona	452	70	5	5	9	4	3	12
Gentil	319	44	2	3	6	2	3	3
Coscia	177	39	2	1	1	1	2	3

The presence of the pest in the bark crevices and the size of its population were determined by making ten incisions, each 2 cm<sup>2</sup> in area, all around the tree trunk, and ten similar incisions on the main branches. The colonies were classified according to the number of aphids (including eggs): 1 - one to five aphids; 2 - six to 20 aphids; 3 - 21 or more aphids.

From Table 2 it is apparent that in the Galilee area the Spadona variety is the one most susceptible to infestations within the bark crevices. Gentil was found to be more infested than Coscia, which is at variance with the 'En Harod findings.

In the Coastal Plain (Miqve Yisrael), during the period from Sept. 1950 to March 1951, aphids were found on the bark and in bark crevices of the following varieties: Artas, Bergamote, Beurrè-Giffard, Claps, Epargne, Flemish-Beauty, Pineapple and Superfine.

### Fruits

As shown in Table 3, Spadona fruit is the most susceptible and infestation of unprotected fruits reached 90-100% in some cases. The fruit of the Gentil

Table 3

Percentage distribution of infested pears in northern Israel, May 9 to July 2, 1968 (in brackets - at tree-tops)

Variety	Number of locations	Number of infestation counts	Number of fruits examined	Infestation groups (in %)					
				0.1-5.0	5.1-10.0	10.1-20.0	20.1-30.0	above 30.0	Total
Spadona	19	59	15,177	18.6 (5.1)	13.6 (8.5)	1.7 (8.5)	(3.4)	(5.1)	64.5
Gentil	11	20	4,152	5.0	5.0 (5.0)	0	0	0	15.0
Coscia	12	22	3,359	4.6	4.6	0	0	0	9.2

variety is much less susceptible and that of Coscia is seldom infested. Quite often, Coscia fruit was found to be entirely free of the pest, while the fruit of neighboring Spadona trees was severely infested.

It appears that the differential susceptibility of these varieties is in part due to the anatomy of the blossom-end of the fruit. Different types of Spadona fruit have been observed, of which three will be discussed here: a) In the "typical" Spadona fruit the calyx lobes, a large number of desiccated stamens and styles stand close together and form a clump, which is easily detached (Fig. 6). The aphids prefer to inhabit the area beneath this clump and therefore this type of fruit is the most infested. The abscission of the calyx of Spadona fruits, after fruit-set, has been described by Simirenko (8). b) The calyx lobes, that have not completely dried up and are not easily detached, are spread out, like a star, similar to in the Coscia (see below), and the space between them and the fruit peel is narrower. These fruits are less infested than those of type "a" (Fig. 7). c) In a number of fruits a deep narrow passageway passes through the middle of the blossom-end, gradually widening towards the center of the fruit. The styles generally close around the opening (Fig. 8). Within this passageway colonies of aphids can sometimes be found. When the infestation is severe, all three types of fruit are attacked, but when slight mainly fruit of the first type is infested.

In the Gentil variety the calyx is open and its lobes are almost on one level with the fruit surface. There is almost no opening and a median longitudinal section shows a calyx depth of approximately 3 mm (1, 13) (Fig. 9).

The calyx of the Coscia variety is open; the calyx lobes are bent backwards like a star and sometimes absciss (8); they stand relatively far away from the centre of the blossom-end and a noticeable space is formed between them and the fruit peel (Fig. 10). It appears that, due to a lack of suitable "hiding places" for aphids, the fruit of this variety is generally resistant to attack.

In practice, special attention should be paid to Spadona fruits of type a and c, for the hiding places of aphids are impervious to those pesticides which are not systemic, or do not have the ability to penetrate deeply, or to volatilize.

In France the late varieties Royale, Curé, Passe-Crassane and, especially, Alexandrine-Douillard, are attacked more than are Louise-Bonne and Doyenne de Comte. The earliest varieties, such as Guyot and Williams, are not infested. French scientists (4, 5, 6) have correlated the degree of resistance of a variety with the structure of its calyx.

#### Buds

There are differences in the susceptibility of buds of different pear varieties to Aphanostigma attack. Details, data and causes have been presented elsewhere (10). However, it is worthwhile to note here that the buds of the varieties Spadona, Coscia and Gentil are only slightly attacked in comparison with the great susceptibility of the Superfine variety (Fig. 11).

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Fig. 1. Bark crevices in a Spadona tree trunk, which serve as hiding places for Aphanostigma.

Fig. 2. Bark crevices and lesions caused by Aphanostigma in large branches of a Spadona tree.

Fig. 3. Damage to shoots caused by Aphanostigma: right, a destroyed terminal bud; left, crevices.



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Fig. 4. Crevices and dead wood in twigs caused by Aphanostigma.

Fig. 5. Necrotic spots on Spadona fruit caused by Aphanostigma.

Fig. 6. Blossom-end of a Spadona fruit in which the calyx-lobes, desiccated stamens and styles stand close together and form a clump.

Fig. 7. Blossom-end of a Spadona fruit in which calyx-lobes are spread out in a star shape.

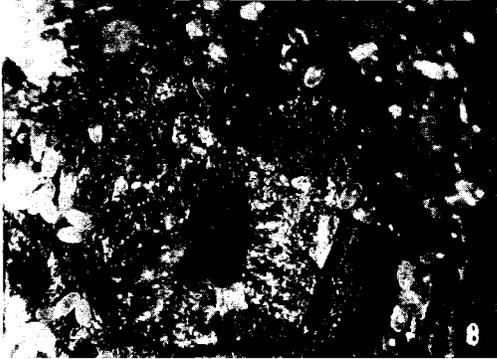


Fig. 8. A Spadona fruit with a deep narrow passageway, which passes through the middle of the blossom-end. A female is seen at the opening; on the surface of the fruit, females larvae and eggs of Aphanostigma are shown.

Fig. 9. Blossom-end of a Gentil fruit with an open calyx.

Fig. 10. Blossom-end of a Coscia fruit with an open calyx, in which the calyx-lobes are bent backwards.

Fig. 11. Superfine buds destroyed by Aphanostigma.