Two Major Pests on Apples

spider mite and woolly apple aphid infestation in late summer damaging to apples for processing

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Acaricides—with long residual value—prevent late season buildup of European red mite and 2-spot mite populations on apples, but control of woolly apple aphid usually requires the inclusion of an aphicide in the mite treatment.

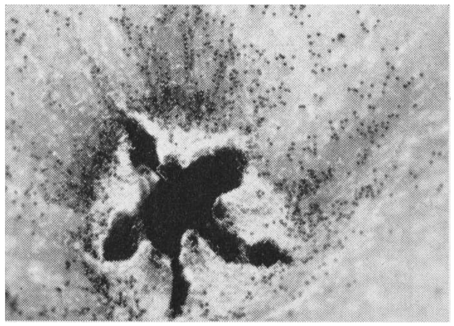
Two species of spider mites—the European red mite and the 2-spot mite—and the woolly apple aphid are major pest problems on apples grown in California. Both species of mites can cause damage to the foliage of the trees, as high populations will cause bronzing of the leaves and even defoliation.

Apple varieties differ in their resistance to mite injury. Varieties such as Red Delicious, Golden Delicious and Jonathan are quite susceptible, while Gravenstein and Newtown Pippin can take rather high mite populations with little evidence of leaf injury.

Another problem that has arisen in recent years in connection with the canning industry is the presence of mite eggs in the calyx end of the mature apples. Under pressure of moderate to high populations, the mites will often lay considerable numbers of eggs in and around the calyx end of apples. In the canning process not all of these eggs can be removed, which often causes a high insect part count in the finished product. Because apples are harvested rather late in the season, mite populations which sometimes build up in late August and September will lay eggs in the calyx end of the fruit, although little leaf injury results to the tree from this late season buildup. Normally, most acaricide treatments are discontinued in August, because of the difficulty of treating orchards after props are set in, and a long residual acaricide is needed to prevent a late mite buildup.

Woolly apple aphid—a pest of apples for many years—causes knots on the roots and twigs of the tree, but, most important, they produce honeydew which blackens the foliage and fruit. One of the major difficulties in controlling this insect is the continuous migration of young forms from the roots to the aerial portions of the tree during the summer months of May to October.

The canning industry is also vitally concerned with this pest, especially on the Newtown Pippin variety of apple. Many fruits of this variety have an open calyx end, and the aphids will migrate into the core of the apple and reproduce in this sheltered area. It is very difficult to remove the core completely in the canning process, and thus the finished product may have a high count of insect parts.



Mite eggs in calyx end of mature apple.

A series of plots to test a number of acaricides for mite control were established in 1953 in a young Newtown Pippin apple orchard at Watsonville. One of the major purposes of the plot was to evaluate the flavor effects of the materials on processed apples. Therefore spray applications were made at predetermined intervals—rather than being based on mite counts—to simulate normal orchard practice, where usually two acaricide applications are made during the season.

The plots consisted of 12 trees each, in a 3 × 4 block, and were unreplicated, with two check plots included. Materials were applied with conventional ground equipment and orchard guns, and the applied gallonage averaged 400 gallons per acre. The sprays were applied on July 1 and August 6.

Mite counts were taken at two-week intervals throughout the season, and leaves for the counts were selected at random from the two center trees in each plot. Because both European red mite and 2-spot mite were involved, 100 leaves were taken at each count. With the 2-spot mite, a plus and minus system of counts was used, and leaves were rated on the presence or absence of mites, with no reference to the actual number of mites present. In the case of European red mite, the active stages were counted.

Summary of 2-spot, European Red Mite Control Plots—Watsonville—1953.

Plot No.	Spray Application and Count* Dates							
	July 1	July 15		Aug. 6	Sept. 10		Oct. 6	
		2-spot**	E. Red***		2-spot**	E. Red***	2-spot**	E. Red***
1	Check	0.0	0.0	Check	54.0	0.9	100	50.0
2	25% Dimite 1½ pts.	0.0	0.0	25% Dimite 1½ pts.	0.0	0.1	8.0	0.9
3	57% Malathion 1 pint	0.0	0.0	57% Malathion 1 pint	0.0	0.1	32.0	3.4
4	50% Genite-923 1½ pts.	0.0	0.0	50% Genite-923 1½ pts.	1.0	0.02	22.0	0.2
5	23% Systox ¾ pint	0.0	0.0	23% Systox ¾ pint	2.0	0.0	26.0	0.2
6	50% Ovotran ½ lb.	0.0	0.0	50% Ovotran ½ lb.	1.0	0.1	14.0	0.6
7	15% Aramite 1½ lbs.	0.0	0.0	15% Aramite 1½ lbs.	0.0	0.06	4.0	2.3
8	50% Sulphenone 3 lbs.	0.0	0.0	50% Sulphenone 3 lbs.	2.0	0.14	22.0	1.4
9	50% 876 1 lb.	0.0	0.0	50% 876 1 lb.	4.0	0.5	18.0	4.8
10	25% Chlorobenzilate 1½ lbs.	0.0	0.0	25% Chlorobenzilate 1½ lbs.	4.0	0.02	24.0	1.3
11	Check	0.0	0.0	Check	64.0	6.9	100	100.0

* Only those counts showing population trend are included.
** Per cent infested leaves.
*** Average number of mites per leaf.

New Banana Squash

improvement sought in strain released to seedsmen in 1953

Glen N. Davis

The orange banana squash—which originated as a selection from the regular or Pink Banana variety—differs from the parent variety in many respects.

The new variety is the result of eight generations of straight selection followed by self-pollination in each generation. The first increase was grown from the seed of one self-pollinated fruit in the summer of 1949 and released to seed producers that fall.

As the name indicates, the variety has a bright orange-colored skin. No slate, gray, or off-colored fruits appear, as is characteristic of the regular Banana strains. The flesh is highly colored and very thick in relation to the cross section of the fruit. The seeds are large, full, and tan in color. The seed cavity is unusually small. A portion of the mature fruits tend to be slightly sickle shaped and perhaps somewhat more pointed on both the stem and blossom ends than is characteristic for other strains of Banana squash.

The fruits of Orange Banana are considerably larger than those of other existing strains. No data on actual yields are available, but the variety is very prolific and individual fruits weigh up to fifty pounds. It is well adapted to any areas of production where Banana squash strains have proved successful.

Orange Banana squash has a very tough—almost woody—rind about one-eighth inch in thickness. Unless severely bruised during harvesting and handling, the fruits will keep in storage for several months. The tough rind is very desirable for that portion of the crop which is sold on the fresh market or placed in storage, but it presents considerable difficulty in peeling and for this reason is not well suited for processing. Work is in progress to develop a strain which will retain the present size and color and replace the tough rind with one more characteristic of other Banana strains, which can easily be handled by the processors.

Orange Banana, as originally released, had one defect which was of concern to seedsmen. The factor or factors controlling seed size and color were apparently not well fixed. Some of the seeds were flat and white instead of being full and tan. Both types of seed, however, produced identical plants and mature fruits. Two additional generations of selection with self-pollination have corrected this defect, and a second release of stock seed was made in the fall of 1953.

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Laboratory Analysis of Orange Banana Squash.
Composition per 100 grams of fresh material.

Moisture (gms.)	Energy* (Kcal)	Protein (gms.)	Calcium (mg.)	Iron (mg.)	Phosphorus (mg.)	Ascorbic acid (mg.)
88.49	31.7	0.87	13.8	0.51	27.1	22.0

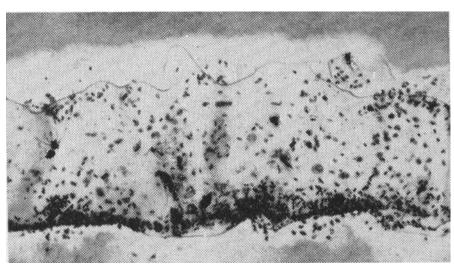
Riboflavin (mg.)	Thiamin (mg.)	Niacin (mg.)	Total sugar (gms.)	Starch (gms.)	Alcohol insoluble (gms.)	Carotene (mg.)
.038	.037	0.83	4.62	2.22	5.40	1.9

* Fat 0.3 gms. assumed in calculation of energy. Value obtained from U.S.D.A. Misc. Publication No. 572, 1945.

The study plot turned out to be a test of the residual value of the acaricides, as mite populations did not build up on the check plots until after the last application in August.

All of the treatments gave what could be considered commercial control, but some of the materials exhibited definite selectivity against the two species of mites in the orchard. Aramite gave excellent control on the 2-spot mite but was not among the better materials for European red mite. The same characteristics were shown by 876. Genite 923, on the other hand, gave very good control of European red mite but was weak in control of the 2-spot mite, as was the case with demeton—Systox. Sulphenone and chlorobenzilate, although providing commercial control, did not measure up to some of the other materials. Malathion apparently does not possess enough residual effect to prevent a late mite buildup. The two materials that gave the most consistent control of both mite species were Ovotran and Dimite.

Both check plots had high mite populations of both species by the middle of September, with considerable leaf dam-



Sticky band showing migration of first instar aphids from roots to aerial parts of tree.

age and numerous mite eggs in the calyx end of the fruit. None of the treated apples had mite eggs in the calyx end.

Two of the materials used caused injury to the apples. Genite 923 caused black spots on the fruit, and the apples from the 876 plot showed brown sunken spots on the sides of the fruit.

All of the plots were carefully checked throughout the season for woolly apple aphid. The malathion treated block had no aphid colonies for the entire season. The demeton block showed a few aphid colonies on the trunk and main limbs but none in the aerial portions of the tree. None of the other materials showed any effect on the aphid populations; however, the infestations were not especially heavy on any of the plots including the checks.

The 1953 experimental plot on apples showed the need for materials with long residual value in order to prevent late season buildup. Several of the materials used showed such residual effects, but their specificity against the two mite species is a factor that must be taken into account. None of the long residual acaricides, with the exception of demeton, appear to have any effect on woolly aphid; therefore it seems necessary to include an aphicide with the acaricide treatments. Really satisfactory control of the woolly aphid has not as yet been realized, however, and this subject will be the focus of further research, directed especially against prevention of migration from the roots.

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