Longitudinal section of VF 145 tomato fruit showing sprouted seeds.

Section of tomato fruit cavity showing sprouted seeds.

SEED SPROUTING

in canning tomato fruit

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SPROUTING OF SEEDS, a physiological disorder in ripe canning tomatoes, has been observed in fruits harvested from various growing areas of California during the past several years. This disorder is of particular concern in the canning of whole tomatoes because the germinated seeds appear as foreign materials. Green or pink colored fruits have not been observed to contain sprouted seeds. Fruits from the mechanical harvesting varieties VF 145 and VF 13L and selections from these lines have shown sprouted seeds. With some of the other varieties, reports of occurrence of the seed sprouting have been quite infrequent (table 1).

Sprouted seeds can be seen only when the fruit is opened and the seed cavity is exposed (see photos). Fruits showing this disorder may include sprouting from only one seed with a radicle just emerging—or practically all the seeds may be in various stages of germination. These seedlings appear abnormal, with very thick and stubby radicles. In extreme cases, the cotyledons are green and the hypocotyls are purple in color (from anthocyanin accumulation). To test the viability of these seedlings and possible abnormal growth, they were removed from the fruit and planted in the soil in the greenhouse. Growth was slow at first but eventually normal plants developed.

Sprouted seeds have been noted in apparently sound ripe fruits. However, the incidence of sprouted seeds has been unusually high in fruits infected with the mold, *Alternaria*. Fruits of VF 145 inoculated with spores of this organism have shown variable amounts of seed sprouting, but the trend was for increased seed sprouting. Further tests are being conducted to study the influence of mold on the disorder.

High nitrogen fertilizer rates and high temperatures increased the sprouting of seeds in tests with VF 145 fruits grown in the greenhouse. In field fertility plots, data from high nitrogen treatments indicated similar trends. These field plots also showed that degree of ripeness is a very important factor in the severity of the disorder. The ripening rate (maturation and senescence) of fruits is influenced by temperature.

It appears that this problem was created by the change from hand picking to mechanical harvesting, and involved new cultural practices as well as new varieties with fruits that remain in sound condition on the vine for a long time—all aimed at obtaining maximum yields from a single harvest operation. Both VF 145 and VF 13L varieties have this desirable characteristic. Data, at present, indicate that the longer fruits of these varieties remain ripe on the vine, the greater is this possibility of finding sprouted seeds (table 2).

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TABLE 1. SPROUTING OF SEEDS IN FRUIT OF FIELD-GROWN TOMATO VARIETIES—DAVIS 1966

Variety	Fruit showing sprouted seeds
	%
VF 13L	63
VF 145	6
VF 6	0
VF 11	0
Ace	0

TABLE 2. EFFECT OF HARVEST DATES (FRUIT RIPENESS) ON PERCENTAGE OF FRUITS SHOWING SPROUTED SEEDS IN THREEE TOMATO FIELDS, 1966

Harvest date	Variety	Location	Fruits showing sprouted seeds
			%
Sept. 13	VF 145	Woodland	2
Sept. 23			6
Sept. 29	VF 145	Davis	0
Oct. 13			7
Nov. 9			10
Aug. 8	VF 13L	Davis	0
18			0
29			1
Sept. 14			11

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BED MULCHES FOR STRAWBERRIES

. . . *petroleum*

. . . *polyethylene*

. . . *combinations*

VICTOR VOTH • H. J. BOWEN, JR. • FRANK TAKATORI

Clear polyethylene proved superior in these tests as a mulching material for strawberries in comparisons with colored polyethylene and petroleum mulch.

CLEAR POLYETHYLENE has been widely used for mulching in California strawberry production since 1957. Because polyethylene does not deteriorate and must be removed before the soil can be prepared for the following crop, experiments were conducted during 1964 and 1965 to compare *petroleum* mulches with *polyethylene* mulches.

Petroleum mulch

Petroleum mulch is a water emulsion of petroleum resins and forms a black film when sprayed on the soil—becoming an integral part of the soil surface. The application and handling are relatively simple, and the film disintegrates in a few months when incorporated into the soil by cultivation.

Preliminary experiments, completed in 1964, determined the amount of petroleum necessary to maintain a film seal for one growing season on winter plantings. Application rates ranging from 500 to 1000 gallons per acre were compared. Approximately 80% of the total surface area was covered, leaving the bottom of the furrows clear. Freshly harvested high-elevation plants of cultivars Fresno, Lassen, Tioga, and Torrey were planted November 18, 1963, at the South Coast Field Station, Santa Ana. The asphalt mulch was applied November 19, before any growth started. The clear polyethylene mulch was applied November 25. Single row, 28-inch beds were used with a basic plot size of 10 plants. Each treatment was replicated six times for each variety. The data obtained from both 1963–1964 and 1964–1965 studies showed the 1000-gallon rate gave the best yield results and maintained the best soil coverage. The experimental design in 1964–1965 was the same except that black, gray-smoked, and clear polyethylene treatments were compared with non-mulched checks on double-row 40-inch beds.

Temperatures

In 1963–64, the temperatures were recorded at both the ½-inch depth and the 2½-inch depth at 2:00 pm from December through March. Only the 2½-inch measurement was recorded during 1964–65 because the average temperature at that depth appeared to correlate more closely with changes in the production pattern.

There was no evidence of damage from petroleum mulch in the winter plantings and the stands were just as good as non-mulched or poly-mulched plants. However, weeds germinated and the seedlings