

Cantaloupe Crown Blight Study

observations reveal disease to be severe on all commercial varieties of spring harvested cantaloupes in desert regions

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The following article is the first of two progress reports on cantaloupe crown blight studies.

Cantaloupe production in Imperial County—a multimillion dollar business—ranks among the county's first 10 agricultural enterprises.

In the years 1951-1955, Imperial County had from 57% to 70% of the total acreage devoted to cantaloupe production in 12 southern counties of California. Imperial County and Riverside County—primarily in the Palo Verde Valley—had about 87% of the total cantaloupe acreage. Twice within the past 10 years the agricultural economy of these two desert area counties has been threatened with reduced cantaloupe production. Early in the past decade cantaloupe mosaic appeared to be the limiting factor in good production in the Imperial Valley. However, a change in the aphid vector habits within recent years indicates that this disease probably is not responsible for the current major reduction of yield and quality of melons.

Crown blight is the second and present threat to cantaloupe production. It has been particularly serious the past three spring seasons in the Imperial Valley of California and in the Yuma and Salt River Valley areas of Arizona. Evidence of the declining production of cantaloupes in Imperial and Riverside counties appears in the table on this page. Declines in acreage and yield have occurred in Imperial County since 1950 but there is no pronounced trend in Riverside County in acreage nor in production. Crown blight does occur in River-

Record of Spring Cantaloupe Production in Imperial and Riverside Counties 1950-1956 as Reported by the Agricultural Commissioners of the Two Counties

Year	Imperial County		Riverside County	
	Acres	Yield crates/acre	Acres	Yield crates/acre
1950	13,733	154.9	2,761	187.1
1951	13,716	78.0	3,196	221.2
1952	8,865	125.2	4,394	134.8
1953	10,903	130.1	4,363	137.0
1954	8,865	106.9	3,829	159.2
1955	8,316	115.7	3,650	120.5
1956	7,234	82.3	5,629	151.2

side County, but not to the extent that it has in Imperial County.

A survey of 20 fields representing all spring cantaloupe growing districts of the Imperial Valley in 1954 showed that 50% were severely affected by crown blight and 70% produced less than the average yield for that season. Twelve fields failed to produce 100 crates per acre and eight of those produced less than 50 crates per acre. The 1955 and 1956 spring seasons were much the same.

Crown Blight Symptoms

The initial signs of the crown blight disorder usually appear just prior to the first harvest—or shortly thereafter—on old leaves at the base of runners. The first symptoms show as chlorotic blotches at the margins, or as V-shaped dead areas with the open end of the V extending to the leaf margin. The leaf may develop an over-all yellowing without the marginal symptoms. Chlorosis as well as marginal death is usually followed by a rapid

progressive drying of the entire leaf and petiole, which remains attached to the main runner. Subsequent death of leaves progressing toward the end of the runner follows—in the same manner—but sometimes alternate leaves are killed rather than adjacent leaves. Ultimately all leaves along the runner die, although the terminal leaves may live longer than the more mature leaves. This symptom usually develops on all the runners, so severely diseased plants have no healthy crown leaves to cover the maturing melons. The exposed melons are usually sunburned and rendered unmarketable.

Another symptom of crown blight is extensive decay of the roots of diseased plants. The 1954 survey of 20 cantaloupe fields in Imperial County revealed that every field severely affected by crown blight had abundant root decay. Premature death of crown leaves probably is associated with an inadequate root system. The few functional roots are unable to supply water and nutrients to the vine rapidly enough to replace water lost to the atmosphere through the leaves. Rapid water loss results from extremely low humidity and high temperature conditions which prevail at harvest time in the desert regions.

Geographical Distribution

Crown blight in California seems to be limited to the desert regions devoted to winter agriculture. Melons in the growing regions of the San Joaquin Valley and the Sacramento Valley have diseases such as *Verticillium* wilt and *Sclerotium bataticola* crown rot which produce similar effects but do not exhibit crown blight in the form found in the Imperial and Palo Verde valleys.

Summer grown cantaloupes in certain areas of Los Angeles County are sometimes affected by *Fusarium* root rot whose symptoms are similar to those of crown blight. Since the causal organism—of *Fusarium* root rot—has been obtained from some rotted roots of crown blight-affected cantaloupe plants in the Imperial Valley, the same organism may also be involved in crown blight.

Serious outbreaks of crown blight in the spring occur also in the Yuma district and, to a lesser degree, in the Salt

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Crown blight of cantaloupe showing the death of the crown-covering leaves which results in the exposure of melon fruits to the sun and subsequent sunburning.



CROWN BLIGHT

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River Valley of Arizona. Those regions are similar in climate and time of cantaloupe production to the desert regions of California.

There is little practical difference in crown blight occurrence on the three varieties of cantaloupes commonly grown in recent years in the Imperial Valley.

Sulfur Resistant Variety 91 often appears slightly less affected by crown blight—possibly because symptom expression is delayed—but ultimately it becomes equally affected. Both PMR 45 and its strain PMR 450 are severely affected when crown blight develops.

PMR 6 and its relative PMR 5 are severely affected by a leaf spotting symptom which appears to be distinct from the V-shaped or over-all leaf chlorosis. The symptom in PMR 6 and PMR 5 is characterized by a scattering of dead spots of leaf tissue and occasional wedge-shaped areas at the leaf margins. However—because symptoms have been produced in PMR 6 and PMR 5 varieties in greenhouse culture under sterile conditions as well as in the field—the symptom expression may not be related to the crown blight problem.

The foregoing cantaloupe varieties were developed by selection for adaptation to spring culture in the desert areas. Varieties grown in other sections of the United States—and numerous foreign plant introductions—have been tested for resistance to crown blight at the United States Southwestern Irrigation Field Station near Brawley. Most of the tested varieties—including wild forms—are so poorly adapted to early spring culture in the desert area that they fail to perform as well as the varieties currently grown. Hybrids developed from crosses of certain wild forms from China with powdery mildew resistant inbreds appear to have a tolerance to crown blight that is usually associated with plant vigor, late maturity, and poor fruit quality.

Seasonal Variations

Crown blight is closely allied to seasonal influences and occurs in all spring producing cantaloupe districts of California and Arizona where melons are planted in the winter and harvested during the spring.

Crown blight has not been observed in the San Joaquin and Sacramento valleys, where cantaloupes are planted in the late spring and harvested during the late summer and early fall. Furthermore, cantaloupes planted in the Imperial Valley during the summer and harvested in the fall are usually free from crown blight even when grown in fields where

crown blight was serious on the preceding spring crop.

Crown blight seems to be restricted primarily to winter and spring cantaloupes grown in desert areas, which suggests that soil temperatures exert a profound influence on the development of the disease. Cantaloupes planted in early March, in contrast to the usual planting date of mid-December, remain relatively free from crown blight. This may be due to temperatures favorable for cantaloupes during early plant growth or unfavorable for agents that cause crown blight.

Soil Factors

Crown blight has occurred in cantaloupes growing in all soil types—from a heavy clay-loam to light sandy soils—of the Imperial Valley.

Within a given field crown blight symptoms frequently appear first on plants growing in well drained ground, particularly where a natural waterway has been filled or directly over drain tiles. Such areas often dry out rapidly because of a low water holding capacity.

Because the initial symptoms of crown blight often appear in irregular areas of a field rather than in individual hills, high soil salt concentrations were once suspected of being responsible for the disorder. However, closer observation revealed that the disease developed regardless of soil salt concentrations. Furthermore, the symptoms of crown blight are not typical of those associated with salt toxicity.

The 1954 survey of crown blight occurrence in Imperial County was conducted on May 26, when only six of the 20 fields had soil moisture conditions described as good. However, yields of four of those six fields were far in excess of the county average. Two fields—in which the soil moisture was described as fair—yielded above average. All nine fields with poor soil moisture conditions had yields far below the season's average. Evidently improving soil moisture conditions during harvest can overcome at least some of the adverse effects of crown blight by delaying the onset of symptoms.

Previous Cropping

Fields severely affected with crown blight usually have a history of continued cantaloupe production. However, alfalfa may also influence crown blight occurrence. In the 1954 survey, five of the 20 cantaloupe fields had just previously been in alfalfa. Three of those five fields produced yields far below the average for that year. The other two of the five fields produced yields above average. Planting cantaloupes following alfalfa is not a practice that will always enhance

crown blight development, but the probability seems greater with this crop sequence.

The relationship of alfalfa growth to cantaloupe crown blight development is not clearly understood but it is known that several root pathogens of alfalfa are also capable of attacking cantaloupe roots. This phase of investigation is being conducted at the Imperial Valley Field Station.

There is less information concerning the development of crown blight in cantaloupes following sugar beets, but the general opinion is that this crop, also, may enhance crown blight, because sugar beets—like alfalfa—have a number of root pathogens in common with cantaloupes.

Root Decay

One of the characteristic symptoms of crown blight—nearly always associated with aboveground symptoms—is the presence of decayed roots on affected plants. Surveys—to determine if any pathogenic fungi were typically associated with the decayed roots—showed that large numbers of fungi were obtained from the roots of cantaloupes with severe crown blight. Plants relatively free from crown blight had healthier root systems that yielded fewer fungi. The pathogenic fungi occurring most frequently on the rotted roots were species of *Pythium*, *Fusarium*, and *Sclerotium*.

These observations on the development of crown blight of cantaloupes revealed that the disease is severe on all commercial varieties of spring harvested cantaloupes grown in the desert regions, particularly in fields continuously planted to cantaloupes or where the immediately previous crop was alfalfa or sugar beets. Also, the occurrence of crown blight is likely to be accentuated in local areas of a field or entire fields which have a poor supply of available soil moisture during the harvest period.

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The second article on cantaloupe crown blight will be published in June and report the findings in experiments conducted to substantiate or refute the observations reported in the foregoing article.