'When' as Important as 'How Much' In

CANTALOUP IRRIGATION

W. D. Pew
Horticulture Department

An awareness and understanding of the irrigation requirements for cantaloups is of utmost importance in their production.

In recent tests the relationships between soil moisture and yield, melon size, drought symptoms, the cantaloup plants' capacity to recover from varying degrees of drought and the incidence of crown blight were studied.

The test consisted of four basic treatments. They were: VERY WET, WET, DRY, and VERY DRY. Four additional treatments were established, two within the very dry treatment to determine the plants' capacity to recover from severe drought conditions and two within the very wet treatment to determine the speed of plant collapse resulting from a complete withholding of water after the plants had been growing on a high water level.

Specific resistances used in the test are shown in the table. Limits of moisture stresses were measured with irrometers, a soil moisture indicator, also with a dial-type tensiometer, and fiber glass-type resistance blocks. The sensitive portion of each instrument was located 10 inches to the bed side and 10 inches below the seed.

Dry Plots Did Well

Based on yields shown in this table, plants grown under the wet treatment moisture level were most productive, yet yields from plants grown on the dry and very wet moisture level plots were almost as high. Yields, as well as the size distribution of melons, in these three cases were not significantly different.

Another important factor should be considered, namely the number of irrigations used in each treatment. In this comparison it is readily obvious that the plants grown on the dry treatment plots were the most efficient in water usage, requiring only seven irrigations. With essentially the same production, the wet and very wet treatments required 12 to 16 irrigations, respectively.

Production from the very dry plots was the poorest, yet with only one irrigation applied very early in the growth period the 33 crates-per-acre yield was most interesting. This response to very limited soil moisture points up the capacity of this crop to withstand moisture stresses from drought conditions. These yields undoubtedly represent the influence of the water supply deposited in the soil by the germination and stand-establishment irrigation.

The fruits apparently had attained enough size to be graded into the 45 melons-per-crate size grouping before the soil moisture had been reduced seriously enough by the plants to stop fruit growth. The tabulated data show that approximately 90 per cent of these fruits were in this size group.

Can Delay Water Too Long

A comparison of data in the table for treatments 4a and 4b indicates there is a stage in the growth of melons beyond which an irrigation is ineffective in causing the fruit to resume growth once it has been stopped for lack of water. Compare figures for treatment 4 and 4b with those for 4a. Note the sharp increase in yield obtained from 4a over the other two treatments. Apparently the late irrigation used in treatment 4b was delayed too long to be effective in overcoming the drought effects in the already maturing fruits.

The influence of early, very frequent and thorough irrigations on later plant growth is shown in treatments 1a and 1b. A comparison of the fruit distribution pattern for treatments 1, 1a, and 1b shows the effect of withholding water late in the growing season from plants initially grown with very high soil moisture. Yield reductions from 1a and 1b were about 35 per cent and 20 per cent, respectively.

From Feast to Famine

An examination of the root systems of plants grown under these treatments provides an explanation for this reaction.

(Continued, next page)

WATER STRESSED (drought) plants. Note wilted appearance of both leaves and petioles.

Effects of Varying Soil Moisture on Cantaloup Production

Treatment No.	Irrigation	Yield By Sizes of Marketable Melons Per Acre 27's	36's	45's	Total	Number of Irrigations*
1	VERY WET (Maximum Irrometer reading 18-20)	70	84	42	196	16
1a	VERY WET (18-20; Irrigation stopped same day irrigation was started in treatment 4a)	11	65	47	123	9
1b	VERY WET (18-20; Irrigation stopped same day irrigation was started in treatment 4b)	38	83	32	153	12
2	WET (Maximum Irrometer reading 35-40)	65	105	53	223	12
3	DRY (Maximum Irrometer reading 75-80)	63	94	44	201	7
4	VERY DRY (Maximum fiber glass block reading high range 50)	0	4	29	33	1
4a	VERY DRY (Irrigation started after plants showed severe drought symptoms for a 2½ week period)	23	57	35	115	9
4b	VERY DRY (Irrigation started 10 days following treatment 4a above)	1	8	22	31	6

*Does not include one germination irrigation and one stand establishment irrigation prior to thinning.

CMV Found In Ariz. Sorghum

Paul D. Keener
Plant Pathology Department

Cucumber mosaic virus (CMV) attacks a variety of plants. Included among the susceptible plants (hosts) are vegetable, field and forage crops and weeds. Among vegetables susceptible to strains of the virus are cantaloups, cassaba melons, cucumbers, watermelons and other cucurbits as well as such crops as beans, beets, tomatoes and others.

In addition to many vegetables, CMV attacks field crops such as alfalfa and sugar beets as well as many ornamental plants like petunia, zinnia, etc. Species of weeds are also susceptible and among these in Arizona fields and fence rows are Ground Cherry (*Physalis* sp.), Redroot (*Amaranthus* sp.), Mallow (*Malva* sp.) and wild sunflower (*Helianthus annuus* L.).

Significance of Wide Host Range

In view of the wide choice of hosts, CMV becomes a problem in any area devoted to crop production. Cropping year after year affords an opportunity for the virus to become established in such reservoirs as perennial weeds and field crops. As a result, an area under cultivation becomes "infested" with virus sources after a few years.

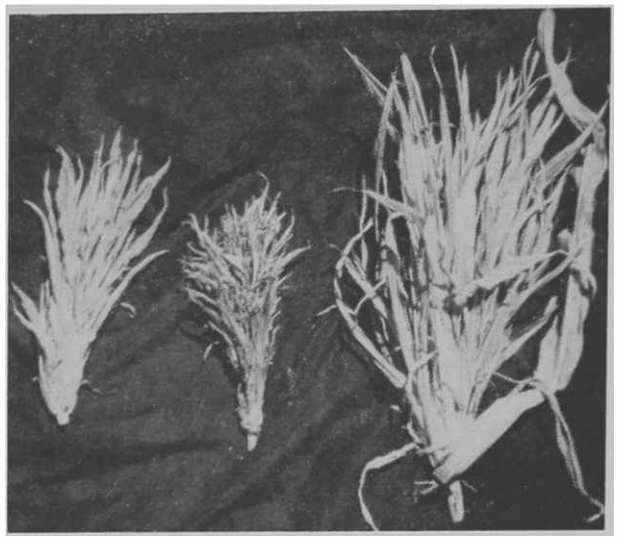
Varietal tests in 1957-58 at the University's Mesa, Ariz., Experiment Station involving various sorghum hybrids, contained many plants showing several abnormalities in growth, among which were stunting, brooming, yellowing and lack of seed production. In the latter instance, the normally occurring flowers were replaced by narrow leaf-like structures. The replacement of flowers by leafy outgrowths is called phyllody.

All degrees from partial seed production to no seeds at all existed in the varieties DD 38, RS 501, and Amak R-10. Phyllody was more severe in DD 38 and RS 501 than in Amak R-10. Combine Hegari showed only slight stunting and yellowing in a small percentage of plants. No phyllody was noted in that variety. All of the indicated symptoms were present in either the original growth or in the ratoon crop.

Symptoms Can Be Confused

Had not CMV been successfully isolated from the plants showing stunting, brooming, yellowing and phyllody, one might suspect that head-smut fungus was the only factor involved. Many of these symptoms occur with attacks of head-smut. It is known that the head-smut fungus does not always produce the black, powdery masses of spores on the outer surface of the plant. In fact, at times such spore masses are not visible to an observer at all. Several head-smutted plants were also found in hybrid sorghums in these plots.

AT RIGHT, stunted, chlorotic (in nature yellowed) broomed plants of sorghum. The variety is DD 38.



Recently, it has become recognized in other disorders that fungus infections often follow virus attacks. This means that both cucumber mosaic virus and head-smut could conceivably be present in many of the plants showing the described symptoms. Actually this was the case in some.

CMV Strains Isolated

The strains of virus isolated from sorghum hybrids into tobacco plants to maintain cultures, gave symptoms quite similar to those produced by viruses isolated from crown-blighted cantaloups and honeydews, lettuce with rib-discoloration and watermelons showing rind-rot symptoms. These host plants with the symptoms indicated have served as sources for the isolation of cucumber mosaics, tobacco ring-spot and other viruses.

In reactions on *Chenopodium amaranticolor* the sorghum isolations gave local lesions typical of cucumber mosaic virus. The lesions were quite similar to those produced on the same indicator plant by strains of some of the viruses isolated from crown-blighted cantaloups and honeydews, lettuce, tomato and alfalfa. Cantaloups with typical bronze-vein or bronze-leaf which often accompany crown blight symptoms, contain the same sort of virus strains.

What Do Studies Suggest?

Crops susceptible to the same strains of pathogens need not be closely adjacent in order for the disease organisms to persist. Intervening areas of weeds and other plants susceptible to cucumber mosaic and other viruses, provide ever-present reservoirs. If insects adapted to virus transmissions, along with suitable temperatures and other favorable factors, are present, viruses will continue to spread. Thus, CMV in sorghums could have originated from one or more of several sources.

BELOW, phyllody — replacement of flowers by leafy structures — is shown in this photo of sorghum, variety RS 501.

CANTALOUP IRRIGATION

(cont.)

The very high levels of moisture encouraged the development of very shallow-rooted plants. Root systems thus developed were capable of supplying the plant needs for water *only* when the soil moisture was maintained at the initially high levels. However, when the water was withheld late in the plant growth cycle, a time when the water demand by the plants is normally high, soil moisture in the surface 6 to 8 inches of soil was quickly depleted. At this point the root systems were incapable of providing enough water to meet the plants' needs. Soon the plants began to "go down" badly.

Even an application of water applied as the plants began to collapse was relatively ineffective in bringing them back into normal production. A study of the soil moisture relationship confirms this fact, as the upper 6 to 8 inches was found to be relatively depleted of its moisture while the lower levels still contained an adequate supply. This water was unobtainable by the plants because of their shallow root systems.