Pod wall strength was determined by measuring the force necessary to puncture the pods with a small steel probe. Peas were removed and pods were stretched over a 5 cm thick block of fine grained styrofoam. A 1 mm diameter stainless steel probe was forced through the pods and into the styrofoam at the points which had covered the center of each pea. The probe was fitted to a Model 1122 Instron utilizing a cross arm speed of 200 mm/min. Depending upon pod length, 5 to 8 force values were obtained for each pod and tests were replicated 2 times (Fig. 2).

In the 3 immature stages, there were only slight and inconsistent differences in the pod puncture force between the 3 southernpea types. In the 4 mature stages the pods of both the resistant lines required significantly more force to puncture than the pods of the susceptible cultivar.

Mature pods of curculio resistant southernpeas require more force to puncture than the pods of southernpeas which are susceptible to curculio attack.

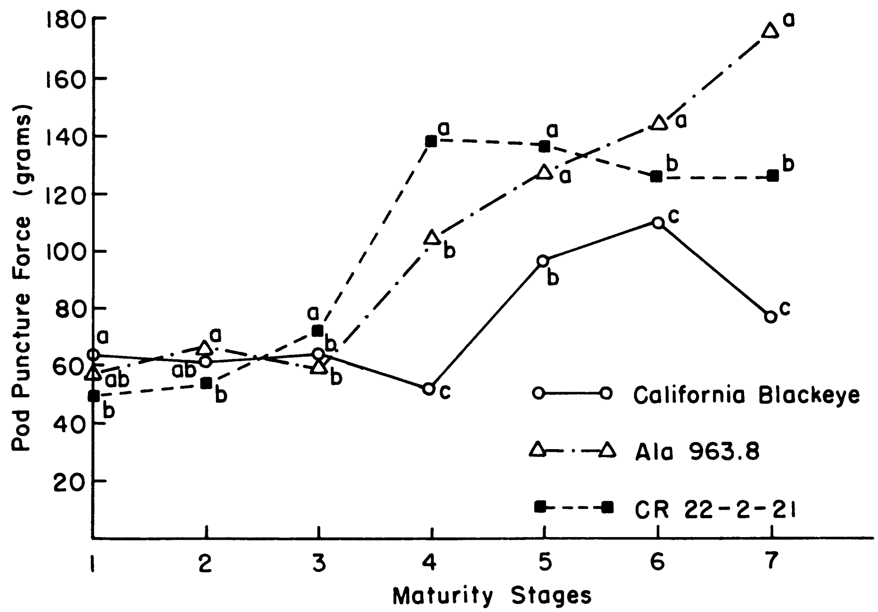

Fig. 2. Force necessary to puncture pods of 3 types of southernpeas at seven stages of maturity (3 – 21 days after anthesis). Mean separation at each maturity stage by Duncan's multiple range test, 5% level.

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Yield Comparisons of Pickling Cucumber Cultivar Trials for Once-over Harvesting[1]

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Additional index words. Cucumis sativus

Abstract. **The 3 common criteria used to express yields of pickling cucumber cultivars are fruit number, dollar value, and kilograms per hectare. In the current study, number of fruit was shown to have the least fluctuation over the time when a single destructive harvest would be made and is suggested as the most accurate criterion for comparing yield of pickling cucumber cultivars.**

Yield comparisons of pickling cucumber cultivars for a single destructive harvest can be misleading because time-of-harvest influences the number, weight, and value of fruit (2,3,4). A delay of harvest by a single day can make a significant different in the weight and value of fruit produced (2,4). When a trial is harvested on a given day, an early-maturing cultivar will have larger, heavier fruit than a late-maturing cultivar of similar yield potential. Dollar value is also influenced by stage of maturity because it is based upon the weight and diameter of fruit, with small diameter fruits having greater value per unit weight.

While harvesting each cultivar at its optimum stage of maturity would circumvent this problem, practical considerations generally prevent it. As an alternative, it might be more equitable to compare the cultivars on the basis of the number of fruit harvested, since fruit number may fluctuate less over the probable harvest period than either fruit weight or dollar value (3). However, data have not been presented to verify this hypothesis.

Data on fruit size and number may not have been presented because once a fruit has been harvest future development cannot be ascertained. This problem was solved by determining the length and diameter of all fruit on the same 20 plants of 'Calypso' pickling cucumber in a commercial field each day during the 1977 season. Measuring began as the fruit were setting and continued after the rest of the field was harvested.

In order to assign weights to the fruit being measured daily, 45 kg of fruit of all sizes were harvested and individually

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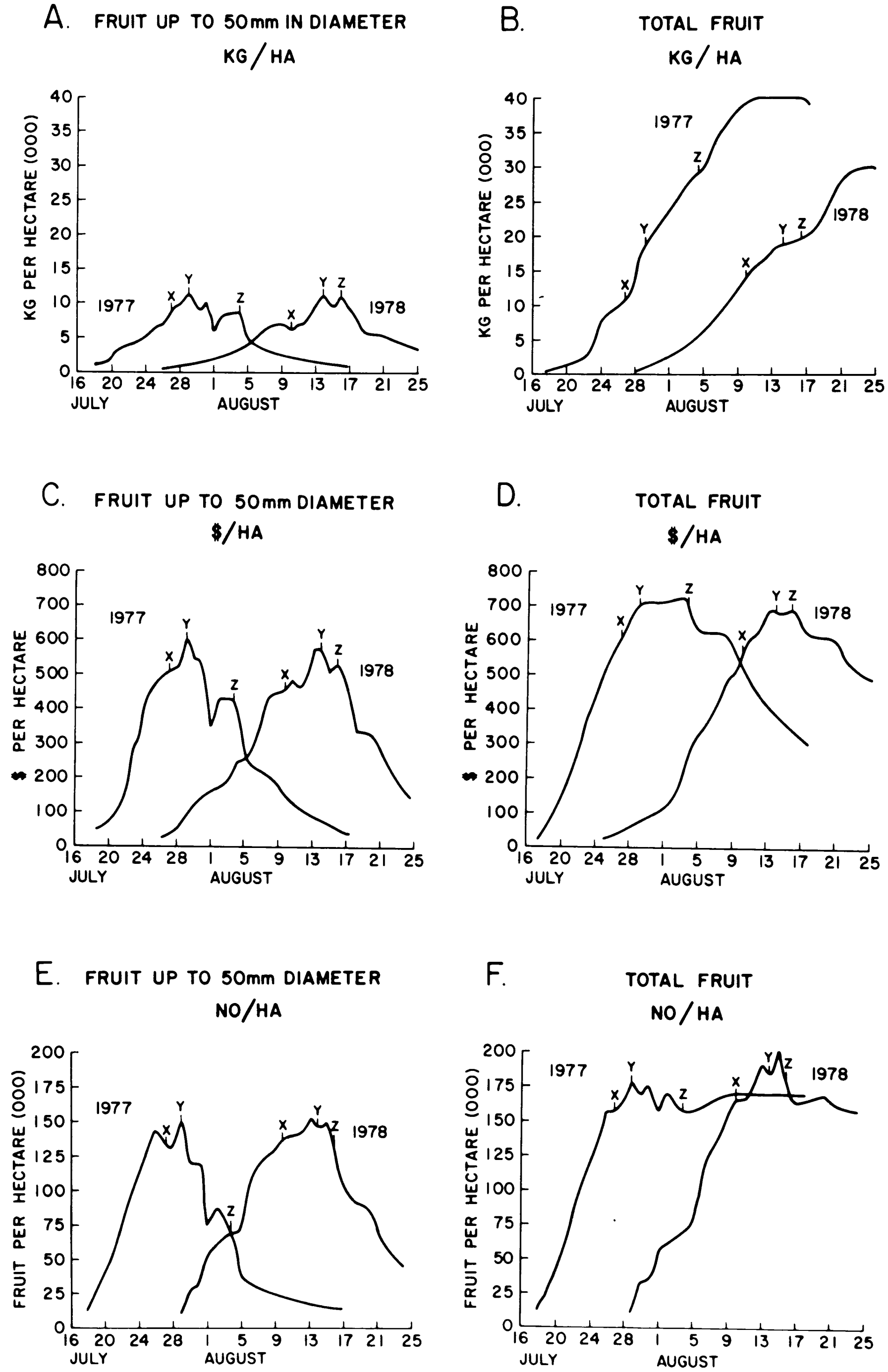

Fig. 1. Simulated yields of 2 cultivars of pickling cucumbers: Calypso in 1977 and Triplemech in 1978. X indicates date when maximum yield of small fruit was available (up to 38mm in diameter). Y indicates when maximum yield of marketable fruit was available (up to 50mm). Z indicates date when maximum yield of large fruit was available (38-50mm).

weighed and measured. These data were then used to develop a table from which the weight of a fruit could be approximated when the length and diameter were known. Fruit weights were used to determine kg of fruit per hectare on a daily basis assuming plant density of 125,000 plants per ha. These weights were also used to determine the dollar value per ha by using the Pickling Cucumber Improvement Committee's formula (1).

A composite of 6 graphs, each reflecting the performance of 2 cultivars of pickling cucumbers over 2 growing seasons, is used to describe their yields.

For a processor to obtain the maximum yield of small fruit (up to 38mm in diameter) which are required for the retail market as whole pickles, the 2 fields represented in Fig. 1 would have been harvested on July 27, 1977 and August 10, 1978 (indicated by points X). To obtain maximum yields of large fruit (38-50mm in diameter) which are used primarily in the institutional trade as hamburger slices, the fields would have had to been harvested on August 4, 1977 and August 16, 1978 (indicated by points Z). Maximum yields of fruits up to 50mm would have been obtained by harvests on July 29, 1977 and August 14, 1978 (indicated by points Y); both dates fall between the dates yielding the maximum number of small and large fruit.

Since cultivars in a trial do not mature at the same time they must be evaluated using a criterion which fluctuates as little as possible after the maximum yield of small fruit is available (Fig. 1, points X). Inspecting the graphs in Fig. 1 it is observed that all yield measurements for fruit up to 50mm in diameter (A, C, E) are alike in that they reach a maximum at about point Y and then fall rapidly. Obviously, using any of these criterion would favor the fortunate cultivars which were at their maximum on the day of harvest and penalize those cultivars that were either earlier or later in fruit set.

The graphs on the right side of Fig. 1 (B, D, F) dealing with total fruit, show a somewhat different pattern. In the first graph, the total weight is shown to increase throughout the observed period. Using total weight as a criterion would favor the earlier-maturing cultivars since they would be further along the curve at time of harvest. The total fruit value in Graph D shows curves which rise to a maximum and fall off rapidly as the fruit mature and become less valuable.

The problem with these first 5 graphs (A, B, C, D, E) of Fig. 1 is that none of the criterion on which they are based gives an indication of the yield potential of a cultivar. They simply indicate that on the day of harvest the cultivar had so many kg of fruit, of various diameters, which were worth so many dollars. Accordingly, the yield potential must be estimated by another criterion.

The initial fruit load represents the total crop for a once-over mechanical harvest. Therefore, the number of fruit initially set represent the yield potential of the cultivar. Those cultivars with a high intial fruit set have a potential for producing both high total weights and high dollar values when harvested judiciously; while those cultivars having a few fruit set initially have little potential for high returns.

As shown in Fig. 1-F, the number of fruit in the initial fruit set are pollinated during a relatively short time period whereafter the curve plateaus and remains fairly constant to the end. As long as the harvest of the cultivar trial is made after all cultivars have set their initial fruit load, the number of fruit per hectare should be a reliable index of the potential yielding ability of each cultivar. In assessing the initial fruit load, the error of calling an ovary a fruit can be avoided by only considering ovaries longer than 45mm in length to be fruits.

The objective of this paper is to direct attention to criteria being used to compare yields of pickling cucumber cultivars and persuade researchers to include total number of fruit per hectare as a yield comparison.

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Use of Plant Desiccants to Control Cucumber Fruit Rot[1]

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Additional index words. endothall, paraquat, captafol, fungicide, belly rot, *Cucumis sativus, Rhizoctonia solani*

Abstract. **The plant desiccants, endothall and paraquat, were used in 2 field experiments to study the effect of a reduced plant canopy on the incidence and severity of fruit rot disease of cucumber (*Cucumis sativus* L.) caused by the fungus *Rhizoctonia solani* Kuehn. In an experiment planted on May 15, 1979, the most effective desiccant treatment reduced disease incidence by 69% and also reduced disease severity. In a later experiment planted on August 8, 1979, desiccants again reduced disease incidence. Paraquat (0.036 kg/ha) applied at first flower reduced disease incidence by 47%. This was consistent with its performance in the earlier experiment. Fungicide treatments with captafol did not reduce disease incidence or severity. The plant desiccants, endothall and paraquat, appear to be potentially useful for controlling cucumber fruit rot disease.**

Fruit rot disease of cucumber, commonly known as belly rot, is a severe deterent to cucumber production in southern states (3, 6, 7). About 35% (25,500 ha) of the land devoted to cucumber culture in the United States is located in this region (1). Cucumber fruit rot in Mississippi has contributed to a decline of over 60% in pickling cucumber acreage in the state since 1969 (1, 6). The major causal organisms of fruit rot are the fungi *Rhizoctonia solani* (5, 7) and *Pythium aphanidermatum* (Edson) Fitzp. (2). The most prevalent organism isolated from rotted fruit in Mississippi has been *Rhizoctonia solani* (6). Efforts to control fruit rot disease have not been successful. Except for fungicide evaluation (3, 4, 5, 6, 7) there is scant literature on control measures for fruit rot. No fungicides have been found to give consistently effective economical control. Therefore, control measures have focused on appropriate cultural practices such as improving field drainage, plowing to turn under the topsoil and plant debris, and limiting plant populations. However, fruit rot continues to be a severe problem even where proper management practices are followed. Inability to eliminate or reduce the disease is due largely to the dense canopy formed by the cucumber plant. Heavy foliage cover restricts light penetration and air movement and promotes humid conditions that are favorable to the growth of fruit rot organisms. It also prevents effective fungicide application (6). Sumner and Smittle (7) observed that fruit rot was 20% in irrigated plots with dense foliage vs only 2% in dry plots with less dense foliage. Even when plant populations are low, the dense canopy and vining habit of the cucumber plant provides an environment favorable to disease development. The objective of this study was to reduce cucumber plant canopy with chemical desiccants and thereby lessen the conditions which lead to fruit rot development.

During the winter prior to the 1979 growing season, 18 chemical desiccants were evaluated in greenhouse tests to determine their effectiveness for use on cucumber plants. Two desiccants, endothall [7-oxabicyclo (2,2,1)heptane-2,3-dicarboxylic acid equivalent 5.5%][3] and paraquat [paraquat dichloride (1,1'-dimethy-4,4'-bipyridinium dichloride)][4] were selected for use in field tests.

'Calypso' cucumber was planted in a Bosket silt loam soil on May 15, 1979. In addition to no desiccant treatment, there were 2 rates and 2 application timings for each desiccant (Table 1). A CO_2 pressurized backpack sprayer was used to apply the desiccants through a No. 8002 fan tip nozzle held 45 to 50 cm above the plants at a volume of 360 liters/ha. Final plant population in rows 102 cm apart was 160,000 plants/ha. Inoculum of *R. solani* grown in a 9:1 perlite:corn meal medium was incorporated into the top 4 cm of soil at a rate of 16 g/m of row on May 31. The plots were kept moist by sprinkler irrigation at the rate of 0.6 cm of water/day, except when precipitation made irrigation unnecessary. Plots 9 x 3 m were replicated 5 times. Single rows 7.6 m long were harvested by hand on June 25 and June 28.

A second experiment was seeded with 'Calypso' on August 8. It was designed to test further the effectiveness of selected desiccant treatments alone and also in combination with the fungicide captafol. Treatments are described in Table 2. Soil preparation and final plant stand were the same as for the first experiment. Plots were not artificially infested because a field which had been inoculated with *R. solani* and planted to cucumbers for 3 consecutive years was used. Desiccant application was the same as in the earlier experiment. A TX 8 cone tip nozzle was used so that leaf desiccation would be concentrated nearer the crown of the plants. Plots 6 x 4 m were replicated 6 times. Two adjacent rows 4.6 m long were harvested September 13 and 17. Fruit rot incidence was calculated for both experiments as the percent of total fruit harvested which showed any kind of rot lesion. Disease severity was determined by using the standard procedure for lesion determination of the Southern Task force of Pickle Packers International (see footnote y, Table 1). Marketable fruit includes ony healthy fruit of acceptable shape not larger than 5.7 cm diameter. Our primary concern was the overall effectiveness of the desiccants for controlling fruit rot, thus the data presented have been pooled over the two harvests for each experiment.

Fruit rot incidence in the first experiment was reduced by 5 of the 12 desiccant treatments as compared to no treatment (Table 1). Disease reduction ranged from 42% to 69%. The trend for disease severity reduction followed that of disease incidence. Desiccant treatments which reduced disease also reduced the number of marketable fruit when applied 7 days post-flowering. When applied at first bloom 2 of the 3 desiccant treatments which reduced disease showed no reduc-

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[3]Supplied by Pennwalt Corp.
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