Irrigation Studies with Carrots

(W. D. Pew and J. H. Park)

Abstract: Data from four years of irrigation studies with carrots indicate this crop has a rather wide tolerance to varying soil moisture levels as measured by yield and quality of roots. Yields have varied between treatments from 514 to 665 crates per acre. Soil moisture levels ranging from a very wet level (18-20 centibars of tension) to a dry level (75-80 centibars of tension) have shown no significant differences in yield. Only from treatment 5, the very dry schedule, was the yield significantly lower than for all other treatments.

Introduction

Of considerable interest in carrot production is a critical evaluation of factors that may influence carrot root length, shapes, smoothness, and yield. In this study, irrigation levels have been used. Five constant water levels and one two-stage moisture level treatments were studied at the Mesa Branch Station over a four-year period to determine the influence of soil moisture conditions on yield and quality.

Methods

Imperator long-type carrots were seeded in the usual commercial manner on beds 40 inches apart with six seed rows per bed. Each set of rows consisted of three individual rows one and one-half inches apart and were planted so that the two sets were six inches apart on the bed surface. The seed was medium sized and in general rather uniform. Planting was done in a dry seedbed with a three-bed vegetable planting sled on September 1, 1964. Seed depth averaged 3/16 - 5/16 inch and was planted at the rate of 3 pounds per acre. On July 9 the area received a 10-ton per acre application of manure prior to soil preparation. October 5, when the plants were four to five inches in height, an additional 100 pounds of nitrogen was applied. Plots were 10' x 50' with the treatment influenced area consisting of 6.67' x 50'. Harvest area was 3.33' x 15' and was located in the center of the major plot. Crop was harvested February 1, 1965. Irrigation applications following the two uniform applications used for germination and stand establishment were as follows:

Treatment 1: October 24, 28; November 2, 6, 10, 16, 23, 28; December 4, 9, 15, 23 - (12 irrigations).

Treatment 2: October 24; November 2, 12, 28; December 11, (5 irrigations).

Treatment 3: October 26, November 6, December 1 - (3 irrigations).

Treatment 4: October 28, November 10, and December 4 - (3 irrigations).

Treatment 5: No application made (rainfall was total water received - 0 irrigations).

Rainfall received during the 1964 test was 3.07 inches and was recorded as follows: November 28 - .28", 19 - .28"; December 18 - .63", 28 - .39"; and January 1 - .40", 6 - .08", 7 - .71", and 8 - .29".

Notes were taken on general appearance of plant tops in terms of vigor, color, and density. Moisture readings were made each day, except Sunday, throughout the test period with dial-type tensiometers and an application of water was made as treatments reached appropriate level of soil moisture. The dial-type tensiometers were placed in two of the replications near the center and an average of these was used to indicate the irrigation schedule for all five replications. Irrigation applications were made for long enough periods of time to reduce the instrument readings to 0.

Results and Discussion

The data obtained over the 4-year period has been very consistent from year to year; therefore, the yield values for the year 1964 will be used as the basis for discussion. Results from four of the five treatments indicated that little or no yield difference was produced regardless of the level of water. In the fifth treatment, referred to as "Very Dry" there was a significant reduction.

The length and smoothness of the roots grown under water levels of treatments 2 and 3 were improved by these moisture conditions. The carrots averaged approximately 1/2" longer than those from the other treatments. Likewise, the roots were more uniform in size, shape, color, and length. Carrots grown under the high level of moisture were shorter and paler and more irregular in color. Those grown under the very dry moisture level were quite rough in external appearance, but tended to be darker in color. Except for the carrots grown on the very dry plots, the sweetness of the roots tended to decrease progressively as the water levels increased. The roots from the very dry plots,

Table 1

Treatment	Crates per Acre	Number of Irrigations
1. Very Wet (18-20 centibars)	659	12
2. Wet (35-40 centibars)	645	5
3. Medium Wet (55-60 centibars)	659	3
4. Dry (75-80 centibars)	665	3
5. Very Dry (over 100 centibars)	514	0

although rather sweet, tended to be somewhat tough and woody. These conditions seemed to develop rather soon following root enlargement.

In summary, it may be said that carrots are rather tolerant to and produce well under a wide range of moisture levels, particularly in the early and mid-season growth periods. Longer, smoother, and sweeter carrots were obtained where the moisture was maintained at just an adequate level, whereas, higher levels of moisture tended to reduce sweetness, color, and length of root.

Drier levels produced tough and woody carrots. Growers should carefully consider and try, on a test basis, growing carrots using less water than is currently customary to determine if these reported advantages can be achieved under his farm conditions.

Response of Dry Onions to Varying Levels of Soil Moisture

(W. D. Pew)

Abstract: Onions respond favorably to increasing levels of soil moisture as measured by increase in bulb size and total yields. Maintaining a soil moisture level of 18-20 centibars of tension (nearly field-holding capacity) produces the greatest yields of bulbs. However, dry onions so produced are somewhat softer in texture, tended toward thick-neck growth, matured slower, and are more difficult to cure adequately in the normal length of time. Onions grown on lesser amounts of water tend to have the reverse characteristics. Costs of production are similarly increased under high soil moisture levels because of the need for replacing nitrogen leached out of the root zone. Also, the costs of the water and its application must be increased. Therefore, the economics involved would be a required consideration.

Introduction

The influence of certain cultural factors on maturation, yield and storability of dry (bulb) onions has been of concern to Arizona growers who are interested in growing and shipping high quality onions. Of the many factors that might be considered, it seemed that the irrigation practice would give the most important influence in producing this kind of production. To measure the influence tests have been conducted over the past five years and have given rather interesting results.

Methods

Yellow Granex onions were planted on October 29 in the usual commercial manner on beds 40 inches apart with six seed rows per bed. Each group consists of three individual rows one and one-half inches apart and were planted so that the two groups were six inches apart on the bed surface. Naked (uncoated) seeds were planted approximately one-half inch deep and at the rate of three pounds per acre. Planting was done in a dry seedbed with a three-bed commercial vegetable planting sled. On July 9 the area received a 10-ton per acre application of manure prior to preparation and bedding. Plots were 10' x 50' with the treatment influenced and harvest area consisting of 6.67' x 50'. A 40-inch or single buffer bed was planted between each plot. Five treatments were used: very wet (18-20 centibars of tension), wet (35-40 centibars of tension), medium (55-60 centibars of tension), dry (75-80 centibars of tension), and very dry (fibreglass block resistance reading of 380 on the high range). Dial-type tensiometers were placed eight inches deep in two of the center replications near the center of the plots. Water was applied when the average of the