

# Influence of CROWN ORIENTATION

F. D. SOUTHER · F. H. TAKATORI · J. I. STILLMAN

---

Asparagus crowns were found to grow upward as new buds were formed above the older crowns. All crowns survived during the duration of this experiment, but those crowns planted upside-down yielded significantly less in both weight and number of spears than those planted upright (normal), sideways, or with roots folded under.

---

**A**SPARAGUS CROWNS are damaged or destroyed whenever the surface of the beds is worked with machinery. The damage appears to be more prevalent in older plantations, which raises the question of whether the crowns do grow upward. And, if the growth of the crowns is toward the soil surface, is the growth pattern influenced by the position in which the crowns were placed at planting time? Frequently the commercial practice in planting asparagus is to throw the crowns into the bottom of the furrow with little or no attempt to arrange them in an upright position before covering them with soil.

An experiment was initiated to study the influence of asparagus crown orientation at planting time on plant survival, vertical crown growth, and spear production. The following crown positions were used as treatments: (1) upright with roots spread (normal position), (2) on one side with all roots extending horizontally away from the buds, (3) upright with all roots folded underneath the crown, and (4) upside down with roots extended.

One year old crowns were placed in 8-inch-deep furrows. As the crowns were placed in the furrow, soil was pulled in around the crowns to hold them in place. The crowns were placed 18 inches apart in rows 5 ft apart. Each treatment was replicated five times.

At planting time, the vertical location of each crown was determined, using a

surveyor's transit and target. Reference points were also established on stationary objects for measuring future crown shifts. After locating the vertical position of the crowns, normal cultural practices were followed.

Each fall for three consecutive years after the initial planting, the vertical location of each crown was determined by use of the transit and target. To measure the crown level, canes from the last flush of growth were cut off just above the soil surface. Next, the target was set on top of each cane stub and measured through the transit. The cane stub was then pulled from the crown and the length of the stub was measured. The sum of these two measurements indicated the vertical location of the crown. The mean for each crown was determined by measuring three canes from each crown.

## Survival

The stand was not affected by the orientation of the crowns at planting time since all plants in all treatments survived the entire experiment. However, those crowns planted upside-down initiated spears much later after planting than the other treatments.

## Vertical Crown Growth

All treatments showed upward growth each year (graph 1). However, the crowns planted sideways had the greatest upward growth the first year and were still highest after three years. Next in upward growth were those planted upside-down. They showed the most rapid increase between the second and third years. Crowns planted with all roots folded under grew upward the slowest, but after three years they were almost at the same level as those planted in the normal position. After three years, crowns planted on one side, and upside-down, had grown upward an average of between 3 and 3½ inches while the other two treatments had grown upward an average of between 2 and 2½ inches.

## Yield

Plants in this experiment were harvested over a period of one month during the first harvest season and for the normal two month harvest season the following spring. The treatment planted upside-down yielded significantly less than the other treatments in both harvest years, as can be seen in graph 2. The other three treatments were not significantly different from each other in either weight or spear count during the two years of harvest. There was no significant difference in spear size among the four treatments.

## Termination studies

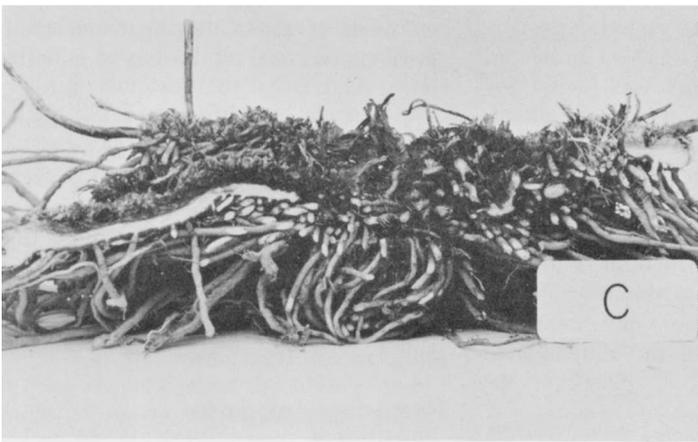
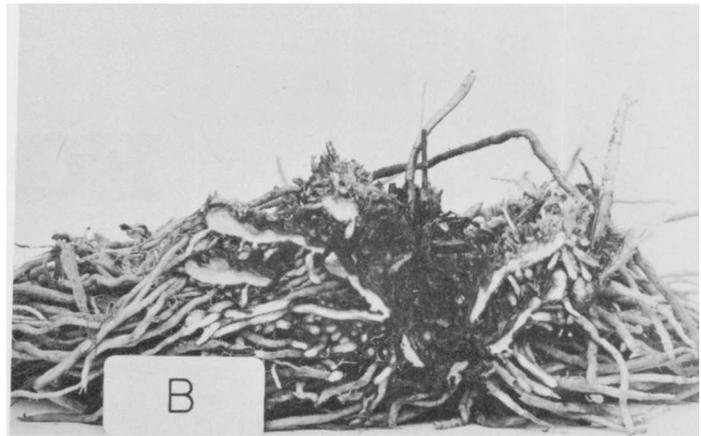
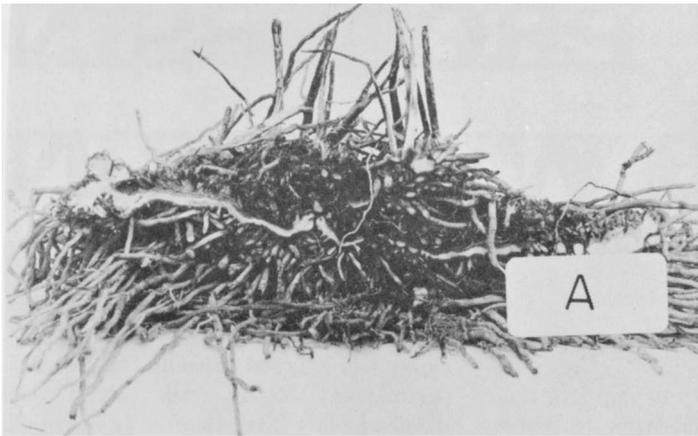
When the experiment was terminated, crowns from each treatment were dug and carefully studied to determine crown growth patterns. Crowns planted in the normal upright position grew some buds above the original crown but the principal direction of growth was horizontal, as can be seen in photo (A). Photo (B) shows that the principal growth pattern of the crowns planted on one side was upward rather than horizontal.

Crowns planted with the roots folded under made very little upward growth but had a horizontal growth pattern similar to those planted in an upright position, as can be seen in photo (C). The ball of roots folded underneath the crown at planting was still clearly visible under the center of the crown at the end of the experiment. In photo (D) of crowns planted upside-down, the principal growth shown was upward—around the old crown, leaving a cavity directly above the original upside-down crown. Several new small crowns formed above the cavity, which explains the rapid upward growth of this treatment.

---

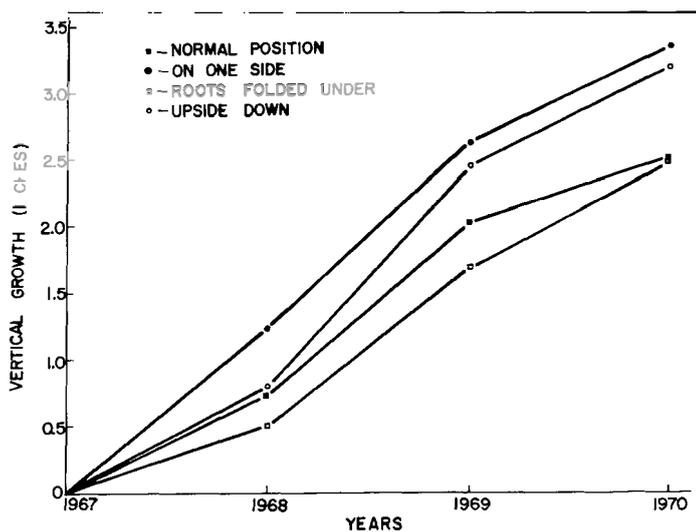
*Franklin D. Souther and James I. Stillman are Staff Research Associates and Frank H. Takatori is Specialist, Department of Plant Sciences, University of California, Riverside.*

# ORIENTATION at planting time on ASPARAGUS



Asparagus crowns planted in normal upright position grew some buds above the original crown but the principal direction of growth was horizontal (A). Growth pattern of crowns planted on one side was mostly upward rather than horizontal (B). Mostly horizontal, and very little upward growth was observed in crowns planted with roots folded under (C). Crowns planted upside-down showed principal growth upward around old crown, leaving a cavity directly above original upside-down crown (D).

GRAPH 1. EFFECT OF CROWN ORIENTATION ON VERTICAL CROWN GROWTH



GRAPH 2. EFFECT OF CROWN ORIENTATION ON HARVEST WEIGHT

