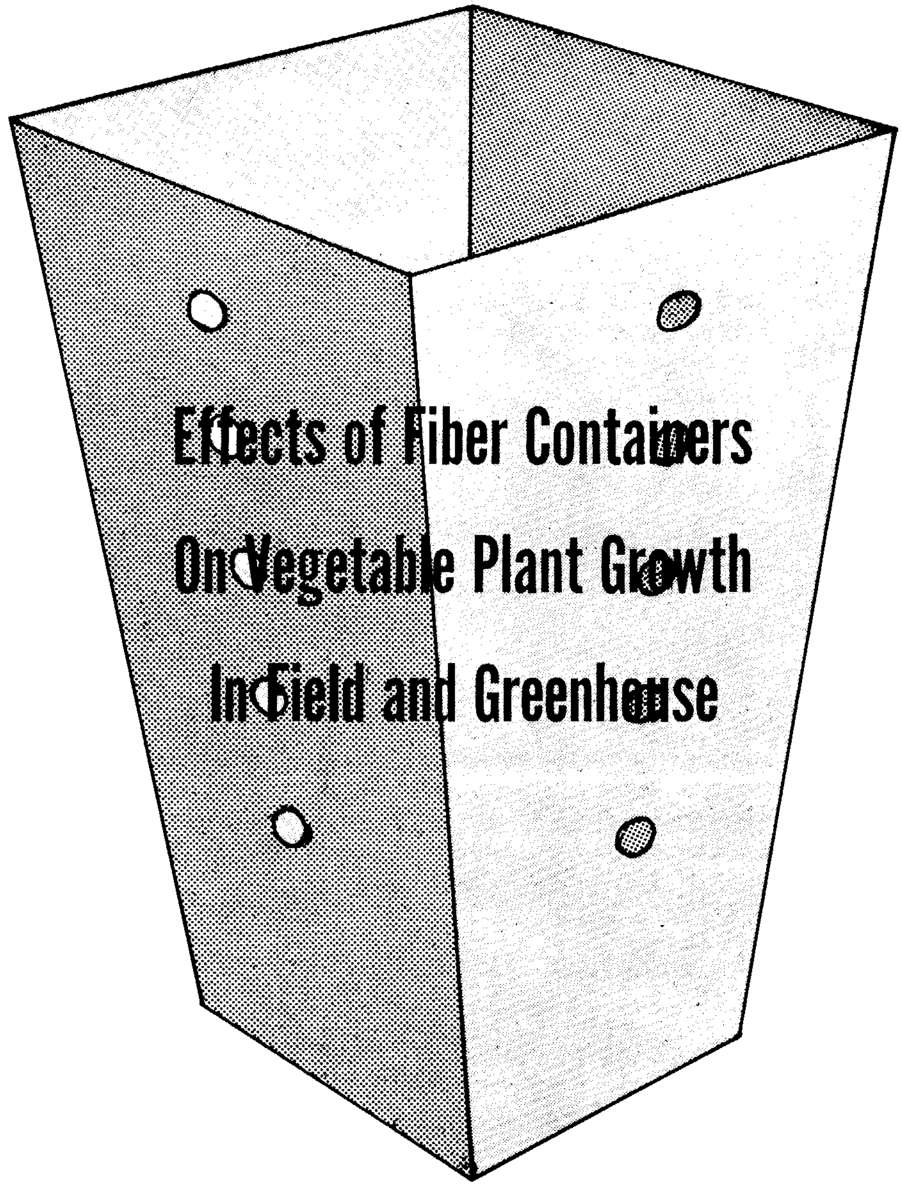
materials exposed on the ground probably sustained considerable weight loss through decomposition, however. More detailed studies of weight loss are underway so that the net accumulation rate of litter may be determined.

Harold Biswell is Professor of Forestry, and R. P. Gibbens is Senior Laboratory Technician, U. C. Berkeley; Hayle Buchanan was College Teacher participant under a National Science Foundation Grant. Dick Benner, Whitaker's Forest, assisted in collecting the litter samples.



Effects of Fiber Containers On Vegetable Plant Growth In Field and Greenhouse

G. H. CANNELL · A. H. HOLLAND · F. K. ALJIBURY

VARIOUS FIBER CONTAINERS are being successfully used for growing ornamental plants in nurseries, and some of these materials are now being used in vegetable crop production. Opportunities exist to increase their use in vegetable crop transplanting, particularly for special soil problems or under unique climatic conditions. However, several new problems arise in using fiber containers for vegetables that are not usually found with existing methods of bare-root transplanting. The problems begin with the initial stage of plant growth in the greenhouse and continue through maturity.

This investigation was concerned with various materials formed into containers of different types and sizes and their effects on plant growth, both in the greenhouse and in the field. Experimental paper materials used in these studies are referred to by the letters A, L, F_1, and F_2. The last two materials differed only in thickness: F_2 was approximately twice that of F_1. The sizes of containers were: 2½ (top) × 1 inch (bottom) square and 6 inches high; and 2½ × 1½ inches square and 4 inches high; all open at the bottom. Five ⅜-inch holes were cut in each side of the containers; the fifth hole placed 3 inches from the bottom. Peat and bagasse (sugar cane pulp) containers of various shapes and sizes were the other materials used in the test.

Peat containers

The peat containers shown in photo 1 are identified as follows: (1) 1⅜ inches square and 2 inches high; (2) 2½ inches square and 2⅜ inches high; and (3) 2½ inches diameter and 2½ inches high.

In a second group, also peat moss, the numbers and sizes were: (4) 2½ inches diameter and 3¼ inches high; (5) 1½ inches diameter and $1\frac{3}{4}$ inches high; (6) $2\frac{1}{4}$ inches diameter and $2\frac{1}{4}$ inches high; (7) $2\frac{1}{4}$ inches square and $2\frac{1}{4}$ inches high; (8) 2 inches square and $2\frac{1}{8}$ inches high.

A third group was as follows: (9) bagasse standard; (10) bagasse neutral; and (11) peat material. Each of these was 2 inches square and 2 inches high.

Celery, tomatoes, and chili peppers were grown in the greenhouse and used as transplants. Direct seeding was used for all greenhouse tests. Three seeds were planted in the center of each container and seedlings were thinned to one plant with formation of the first two true leaves.

California B or C mix (U. C.-type soil mixes for container-grown plants) with recommended fertilizer additions to the soil was used in all the studies. Additional applications of nitrogen at 5 to 10 ppm soil in the form of NH_4NO_3 or KNO_3 in solution were applied in the greenhouse studies, as needed. With the exception of more lateral growth of tops in the larger containers, plants of relatively equal size were grown in all containers. Since the soil volume of a container affects the total quantity of fertilizer and water available for plant growth, more frequent irrigations and additions of nitrogen fertilizer were required for smaller containers to compensate for the soil volume effect in the larger containers. The distribution of soil moisture in the containers following an irrigation varies with depth. Thus, the soil moisture content in the surface layer for tall containers was less than for short containers. Decreased plant growth was observed in the initial stages of the seedlings in tall containers when compared with seedlings in short containers; both had been subjected to the same irrigation regime.

Celery plants were grown in the greenhouse in the 6-inch paper containers and transplanted to the field. At time of transplanting, the paper containers were removed from half the total number of plants. In addition to these treatments, transplants grown in the usual manner in the greenhouse were included for controls, as bare root; however, the root systems were larger than bare-root plants that are usually transplanted.

Treatment comparisons are shown in the composite (photo 2) of samples taken at different times during the growing season. There were only small differences among plants in the controls, the group with paper removed, and in the treatment where roots were able to penetrate the paper material. The size of plants was materially reduced where roots were not able to penetrate the paper. Some roots protruded through the holes in the containers, but these were not sufficient to carry on normal growth. The distorted root patterns can be observed in all cases where the paper material did not permit roots to emerge into the soil.

Tomato plants were transplanted to the field in late September at the South Coast Field Station, Santa Ana, and harvested two weeks later. The percentage of dry weight of tops and roots grown in containers of peat and paper materials is shown in the graph. Results from all peat material were combined and these values are compared with paper materials where roots were not able to penetrate and with paper materials where roots did penetrate. The peat containers showed highest yields for both tops and roots. Lowest values were associated with paper containers where roots could not penetrate. No attempt was made in these studies to differentiate between sizes or shapes of containers and their effects on yield of tops or roots.

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Materials and assistance in these investigations were obtained from Flintkote Company, Los Angeles; Jiffy Pot Company of America, Division of George J. Ball Company, Chicago, Illinois; Pullen Molded Products, Inc., New Iberia, Louisiana; and Willis-Reynolds Corporation, Lebanon, Indiana.

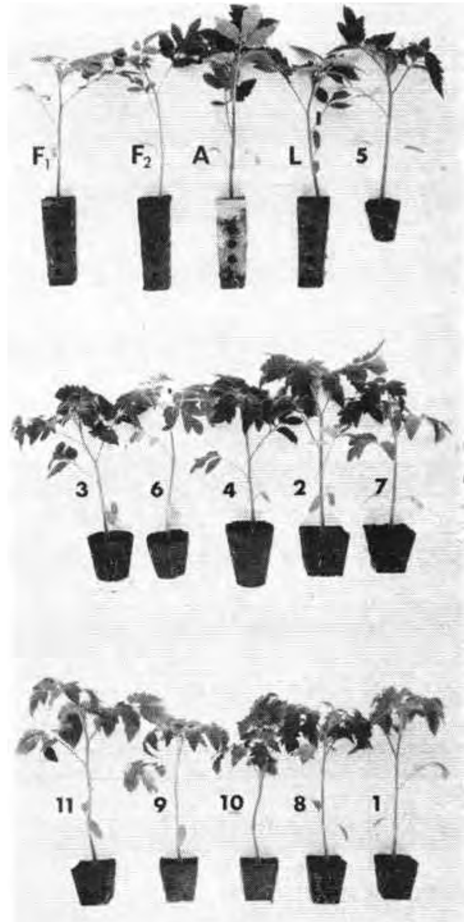
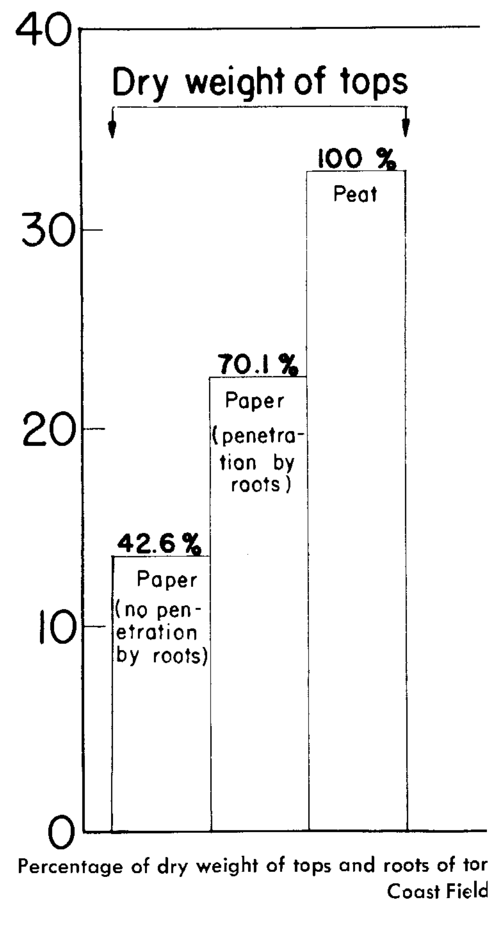


Photo 1. Fiber containers used in plant growth ir



Percentage of dry weight of tops and roots of tor
Coast Field

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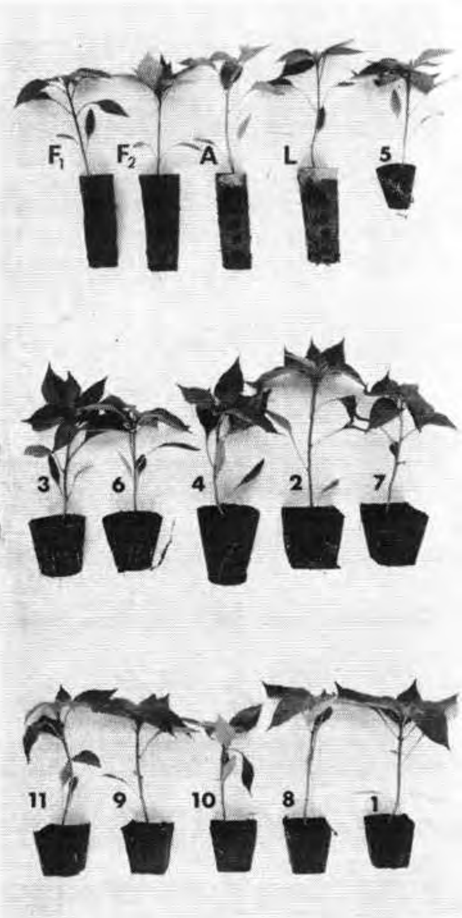
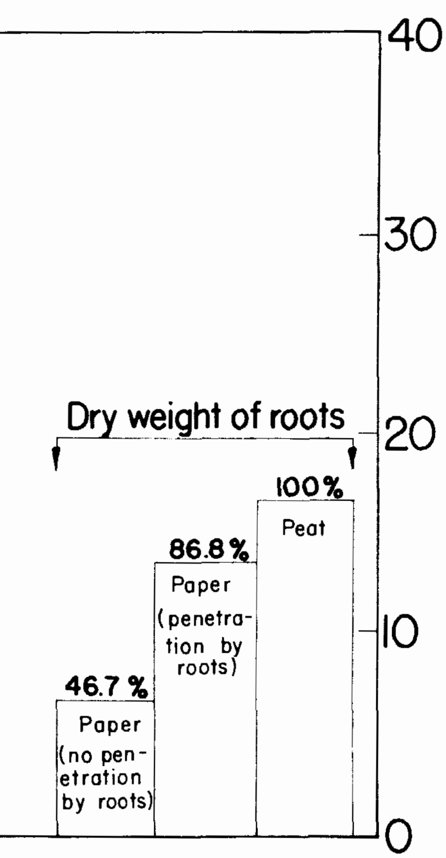


estigations (see text for identification).



atoes grown in containers in the field at South Station.

Photo 2. Root growth development in celery as affected by containers (see text for identification).