

HEAD LETTUCE Growth and Nutrient Absorption Studies Indicate Need for Re-evaluation of Fertilizer Practices

In Salinas Valley trials, Great Lakes lettuce produced more than 70% of its fresh weight during the 21 days before first harvest—and absorbed over 70% of the total nutrient uptake of the crop during the same period. These results indicate that the practice of some growers using a preplant application of from one-half to two-thirds of the total amount of nitrogen to produce the crop is questionable. Since lettuce absorbs little nitrogen in the early phase of growth, a more realistic program would include preplant applications of only one-fourth the amount of total nitrogen to be used and two side-dressings to apply the balance—one after thinning and a second a month before the predicted first harvest.

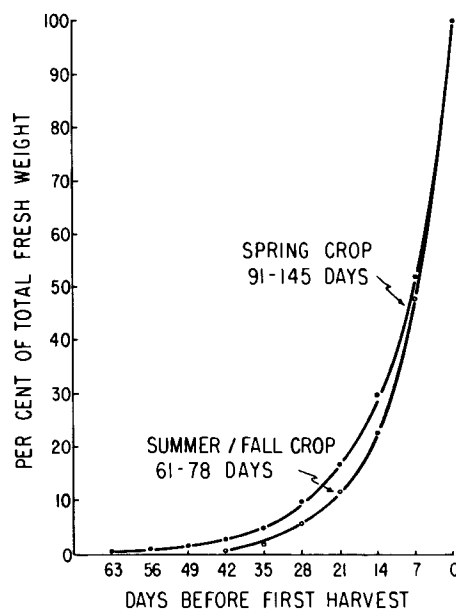
F. W. ZINK · M. YAMAGUCHI

crop, which requires approximately 91 to 145 days, and (2) the summer or fall crops, which require approximately 61 to 78 days.

Growth patterns

Spring crops were found to produce more than 70% of their ultimate fresh weight in the three weeks before first harvest, and better than 36% of this growth was produced in the last week before harvest. The summer and fall crops produced more than 80% of the total fresh weight in the three weeks before first harvest, and over half of this growth occurred in the week immediately preceding harvest.

The percentage of dry matter harvested also appears to be influenced by



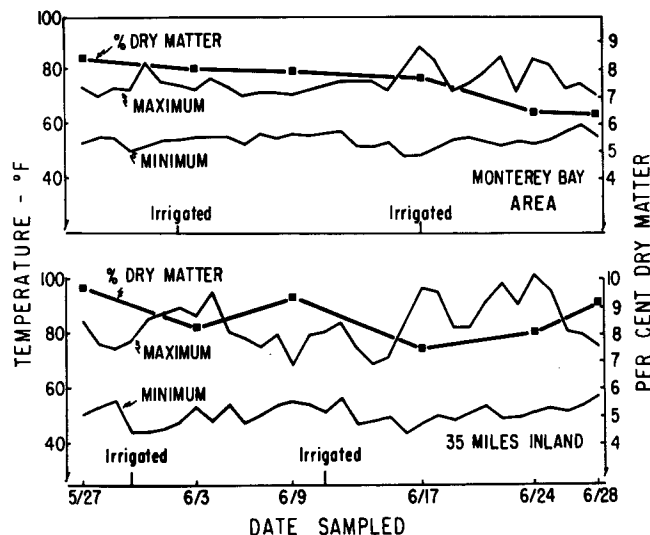
GROWTH, EXPRESSED AS % OF TOTAL FRESH WEIGHT PER PLANT, FOR SPRING AND SUMMER OR FALL LETTUCE

CALIFORNIA RANKS first in the commercial production of head lettuce in the United States, accounting for over 57% of the national production in 1960, valued at \$96,540,000. Growth pattern and nutrient uptake data reported here offer growers a basis for better evaluation of fertility requirements, as well as insect and disease control needs for obtaining quality production with minimum cost.

The climate in the Salinas Valley is influenced by surrounding hills and the sea, creating a number of microclimates within the lettuce-producing areas. To include these climatic variables, 17 commercial fields were selected throughout the Salinas Valley and trials were located on seven soil types considered representative of this area.

The lettuce crops can be separated into two groups based on time required to reach market maturity: (1) the spring

COMPARISON OF % DRY MATTER OF LETTUCE GROWN IN THE SAME SEASON BUT AT DIFFERENT LOCATIONS AND UNDER DIFFERENT CLIMATIC CONDITIONS



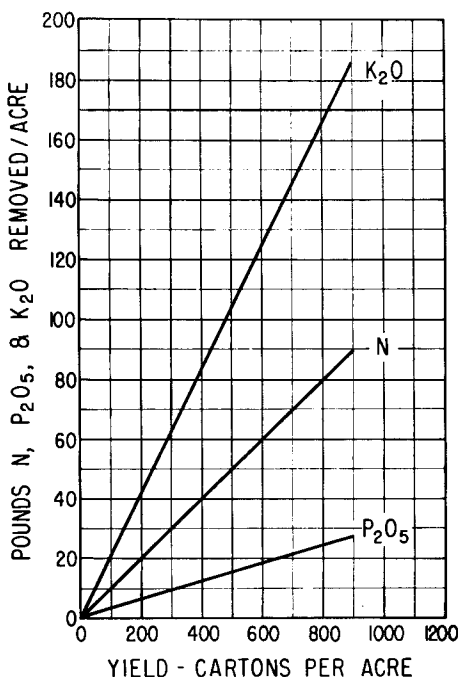
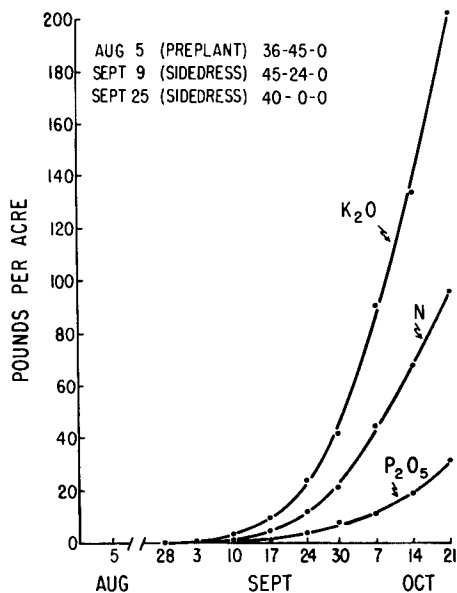
climatic conditions and/or the irrigation schedule, as demonstrated by trials grown during the same period in different locations and microclimates. A trial grown in the Monterey Bay area under moderate temperature and wind velocity decreased in percentage of dry matter as the plants approached market maturity. The dry matter at first harvest was 6.3%. In another trial grown some 35 miles from the Bay, under increased temperature and wind velocity, and with no irrigation during the 18 days before first harvest, the dry matter increased in the last 12 days to 9.1%.

Great Lakes has a broader temperature adaptation range than the Imperial varieties and is widely adapted to culture under different environmental conditions. The temperature and growth data suggest that the Great Lakes variety can be grown to marketable size under conditions with a mean air temperature range of 51° to 67°F during the last three weeks before harvest.

Nutrient uptake

The nutrient removal from the soil by the crop was calculated from the plant analyses and growth rates based on an average of 22,200 plants per acre. The rate of nutrient removal was very slow during the early phase of growth. Approximately one week after thinning, the crops studied had removed less than 2.5 lbs of nitrogen, 1 lb of phosphoric acid (P_2O_5), and 4 lbs of potash (K_2O) per acre. Maximum rate of growth during

MINERAL ABSORPTION OF LETTUCE PLANTS DURING THE GROWTH OF A TYPICAL TRIAL—based on 22,200 plants per acre, fertilizer rates expressed as pounds of N, P_2O_5 , and K_2O per acre, dates of application shown.



POUNDS PER ACRE OF NITROGEN, PHOSPHORIC ACID, AND POTASH REMOVED AT DIFFERENT YIELD LEVELS—calculated on basis of 45 lbs. fresh-weight lettuce per carton at 6% dry matter and mineral content for N=3.7, P=0.5, and K=6.4 expressed as % of dry weight.

the 21 days before first harvest was accompanied by the maximum rate of nitrogen, phosphorus, and potassium uptake. During this period, more than 70% of the nitrogen, phosphorus, and potassium was removed.

Similar trends for total absorption were found for calcium, magnesium, and sodium. The total uptake of nitrogen, phosphorus, and potassium was very similar to that of total dry-matter production. By first harvest the crop had removed an average of 95 lbs of nitrogen, 27 lbs of phosphoric acid (P_2O_5), 208 lbs of potash (K_2O), 9 lbs of sodium, 33 lbs of calcium, and 12 lbs of magnesium per acre. For best results, the fertilizer program should be evaluated on the basis of residual fertilizer in the soil and nutrient requirements, as indicated by the growth pattern of the crop.

The information reported here is also applicable to the Great Lakes variety when grown in the central coastal districts of California, because of the similarity in growing conditions.

F. W. Zink is Specialist in the Experiment Station, Department of Vegetable Crops; and M. Yamaguchi is Associate Olericulturist in the Experiment Station, Department of Vegetable Crops, University of California, Davis.

Growing Short

—THREE TREATMENTS

H. C. KOHL, JR. · R. L.

Leaf-spray treatment of poinsettias with the growth retardant N-dimethylaminosuccinamic acid (B995) decreased plant height without injury or increased production time, but did not result in foliage density and bract size comparable with plants treated with CCC. Both CCC and B995 were more effective in shortening plants than variable temperature-forcing treatments.

BOTH VARIABLE TEMPERATURE forcing and drenching with 2-chloroethyltrimethyl-ammonium chloride (CCC) have been reported in previous articles as methods for producing short poinsettias. These methods are compared in this report with a leaf-spray treatment using N-dimethylaminosuccinamic acid (B995) which had been reported to have growth retardant properties on other plant species.

The small side shoots, resulting from terminal pinch on September 10 of rooted

CALIFORNIA AGRICULTURE

Progress Reports of Agricultural Research, published monthly by the University of California Division of Agricultural Sciences.

William W. Paul.....*Manager*
Agricultural Publications
Jerry Lester.....*Editor*
California Agriculture

Articles published herein may be republished or reprinted provided no advertisement for a commercial product is implied or imprinted. Please credit: University of California Division of Agricultural Sciences.

California Agriculture will be sent free upon request addressed to: Editor, California Agriculture, 207 University Hall, 2200 University Avenue, Berkeley 4, California.

To simplify the information in California Agriculture it is sometimes necessary to use trade names of products or equipment. No endorsement of named products is intended nor is criticism implied of similar products which are not mentioned.

