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FORM C - Series 5120
Page 1

UNIVERSITY OF CALIFORNIA
DIVISION OF AGRICULTURAL SCIENCES
AGRICULTURAL EXPERIMENT STATION

PROJECT NO. 1686 PAGE

A. B. Carlton
Project Leader

Davis: Soils & Plant Nutrition
Campus and Department

Progress report for calendar year 19 65
(Type this report single space)

1. TITLE Peat land conservation and peat dust abatement

2. PERSONNEL A. B. Carlton

3. COOPERATION (Other departments and outside agencies) Agricultural Engineering

4. SOURCE OF FUNDS: University X Federal
H, MH, RRF, CRF, or F (McIntire-Stennis)

Grant
Indicate granting agency, and number of grant. Include USDA grants, contracts, and agreements here.

5. PRINCIPAL RESULTS OF RESEARCH, and usefulness of such findings to agriculture and the general public. A clear, concise statement for the calendar year. Use an additional page if necessary. Confidential information should be so marked.

Dust storms in the San Joaquin Delta region continued to be monitored as in previous years. The results, however, are more difficult to interpret precisely. As in the past two years (with virtually 100% of wide-spaced white asparagus in San Joaquin County inter-row planted for dust control), the number and intensity of dust storms from westerly winds was very materially reduced from both the average and minimum established during the six-year base period before any extensive dust control measures or crop pattern changes. In 1965, there were only 17 such dust storms, 77 per cent of which occurred in the six-week period from mid-May to the end of June. All but three of these were only mild or very mild. Of the three moderate storms, one was caused by exceedingly strong winds (which prior to inter-row planting would have caused a severe and very severe dust storm), and the other two were either of brief duration or highly localized. Although some, perhaps much, of this measured dust reduction can be attributed to the inter-row planting of wide-spaced white asparagus, there has been a significant change in crop pattern in the organic soils of the Delta over the past year or two, with considerable acreage of white asparagus being plowed out and replaced by grain such as corn and milo. The extent of this crop pattern change is not known at present, and it cannot be determined how much of the observed dust reduction can be attributed to inter-row planting and how much to the change from asparagus to corn and milo on part of the area.

California Spot Climate Recorders were operated at two locations (Terminous Tract and Bacon Island) to continue the collection of data on dust-causing wind direction and velocities. In addition, temperature records were used for assessing the suitability of the Delta climate for premium wine grape production.

Two possible solutions to the potential soil and dust problems arising from the operation of the experimental white asparagus harvester which were reported last year were investigated. The use of water by sprinkling from an irrigation system was used: (1) To attempt to put a wind-resistant crust on the soil by means of frequent light waterings, and (2) By heavier, less frequent waterings to maintain the asparagus beds at a higher moisture level to prevent breakdown of structure. Tests were essentially duplicated on two different peat soils-- (different islands-Staten Island and Bouldin Island) and various rates of water application for both types of experiments were tried. Results were evaluated by visual observations of dust and wind erosion, measurements of

bed deformation, soil structure analysis, and certain asparagus quality measurements. Light sprinkling of ¼" to ½" following each harvest was found to put a fragile but wind-resistant crust on one soil which effectively prevented erosion and dust, and maintained bed shape from one harvest to another. Experience has shown that many, if not most, of the Delta organic soils, form such crusts. No crust was formed on the other soil, and wind erosion readily took place within a day. However, even here, beds did not lose their shape from wind as readily as non-sprinkled beds. Heavily sprinkled beds at all rates on both soils were dusty most of the time and suffered bed-shape loss except for 5 or 6 days following the infrequent sprinklings. These heavy waterings were incompatible with the harvester, too much dirt going over the belt with the asparagus. Machine-cut beds showed little or no loss of structure by gentle, dry sieving methods but did show some by in situ clod count techniques. Rust count on asparagus was not increased by any of the sprinkling methods.

Soil temperature and heat flow studies begun last year to provide a basis for proposing management practices that would warm up organic soils earlier in the season were continued and expanded. A soil temperature profile probe utilizing four thermistors imbedded in the side of a thin, hollow, fiber-glass tube and simultaneously measuring four soil temperatures to a depth of 18" was designed and constructed. Precision of individual sensors to 0.1°F. to 0.2°F were obtained with care in calibrating, reading, and equilibrating the probe. Temperature profiles to 15" were taken in selected fields periodically through February and March in an attempt to correlate asparagus emergence with soil temperature. As might have been expected, although this emergence was found to be temperature sensitive, other powerful, but not clearly-defined, factors were at work as well. In one case, a soil treatment (flooding) resulted in a decrease of soil temperature by 3 F. but a greater emergence early in the season. Other similar anomalies were noted. The minimum temperature at 1 foot depth discovered last year was explained by this year's work. The cold pulse generated by cold night-time temperature travels downward, reaching a depth of 9" to 12" from mid-day to late afternoon. The sought-for reversal of heat flow (report last year) was again not found, possibly because the experiments this year were begun too late (Feb. 11).

Measurements of subsidence within the profile which were begun late in 1962 were continued. Using the 5' plate which is continuously below the water table as datum, net subsidence during 1965 was virtually nil (order of 1/16" or less) although a reversible expansion of ¼" in the 3" - 5" depth portion took place on raising of the water table to 24". No traffic is allowed on the plots, and it is hypothesized that as soil mass is lost from the profile, a concomitant decrease in bulk density takes place thereby maintaining the same soil volume. If this is true, an equilibrium should be established in time when subsidence will again become evident.

Under Objective No. 2 of the project outline, a comprehensive study of the feasibility of premium wine grape production was begun in cooperation with the Agricultural Extension Service. A virus-free mother block established on Ryde sandy loam was used for the study. Soil analysis, petiole analysis, expressed juice analysis on ten varieties and temperature records were collected. Soils were highly acid (pH 3.5-5.0), had moderate amounts of salt without being saline, ran 10 per cent to 20 per cent organic matter and produced no nutritional problems as evidenced by foliar symptoms or petiole analysis. The high organic matter did not produce so high a nitrate status as to cause low-sugar grapes. On the basis of total acid and per cent sugar, five of the ten varieties produced grade 1 juice for wine making. A higher than usual pH of the juice may be related to the daily temperature distribution which is different from the Lodi area. Degree days at plot (Mandeville Island) in 1965 - 3441. (Lodi was 3435.)

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6. WORK PLANNED FOR NEXT YEAR, and possible reorientation of investigation

1. Continued monitoring of dust storms and weather.
2. Continue study of wind erosion control methods associated with the mechanical asparagus harvester. (a) Repeat 1965 tests on new soils. (b) Study effect of every-row, inter-row planting on machine-harvested beds. (c) Study practical means and economical feasibility of applying water at low rates.
3. Continue subsidence profile measurements and establish more detailed subsidence measurements on two islands to study effect of irrigated pasture, other factors.
4. Modify soil temperature profile studies to better understand soil temperature relation to asparagus growth and determine time of net soil heat flow reversal.
5. Continue wine grape variety adaptability studies another season including petiole N vs. soil N through season.

7. PUBLICATIONS issued or manuscripts prepared during the year

None

8. ..... December 10, 1965
Signature of Project Leader — Date
Alan B. Carlton

9. .....
Signature of Director (For Federal Projects only) — Date

D-029852