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1. Title PEAT LAND CONSERVATION AN PEAT DUST ABATEMENT

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5. As in previous years dust storms were monitored in the San Joaquin Delta region for the purpose of evaluating the effectiveness of massive dust control measures (inter-row planting of grains in asparagus) and for establishing "norms" against which to measure future changes in delta agriculture. The total of 28 westerly dust storms (19 of them in the "very mild" category and only three "bad" storms) again, for the third year in which massive controls have been applied, shows a decrease in both number and intensity of dust storms affecting populated areas. Adding to the strong evidence that the decrease in dust storms is caused by the control measures is the change in distribution of dust storms during the year. There has been a decrease in the percentage of "bad" storms occurring in May and June, the months during which inter-row planting of asparagus is most effective.

Potential soil and dust problems arising from the operation of an experimental white asparagus harvester in peat soil were studied. The soil was found to dry out to the depth of cutting, about 8", and to lose most of its structure. This soil change resulted in two problems. (1) The soil became progressively more fluid and by the end of the experiment (about ½ a normal cutting season) it became difficult if not impossible to prepare a "ridge" which would maintain the necessary shape. (2) Careful observation during windy and dust storm conditions clearly showed that mechanically harvested white asparagus was dustier during harvest and much more subject to wind erosion, even when interplanted with barley, than hand harvested asparagus. There is considerable doubt whether inter-row planting will control dust in mechanically harvested white asparagus (as done in 1964) sufficiently to be accepted by the general public. Studies to be aimed at these problems are described later in this report.

One of the major problems for asparagus growers using inter-row planting as a dust control measure is the control of barley volunteering in asparagus fields during late fall and winter. Certain cultivation methods have been worked out under this project that give adequate control. In some years, however, weather conditions make the methods difficult to apply and less effective. Experiments with herbicides have shown that dalapon, sprayed onto the growing barley rows under certain conditions cuts down germination and consequent volunteering to an acceptable level. Large scale experiments with commercial application and recommendations of dalapon for this purpose have been impossible because of lack of residue information. This year a series of dalapon residue experiments in interplanted white asparagus. Spraying and harvest schedules running up to the most adverse allowed under Federal registration as well as normal barley volunteer control conditions were tested. Under only one exaggerated set of condition did the residue approach questionably close to the Federal tolerance. This set of conditions is easily avoided and would never obtain when spraying for volunteer barley control.

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It is the nature of the organic soils of the delta to become progressively more saline. Fields must be periodically leached to prevent excessive salt build-up. There are theoretical reasons why the most used method, the ~~more~~ flooding of large areas without any internal operating drains, should not be as effective as other methods. Analysis of soil samples taken from numerous locations in a field before and after flooding substantiate the theory in part, the ratio of salt removal being lower than that established for another method. However, there was greater salt removal in one to three foot depths than was anticipated. Study of the salt profiles leads to the conclusion that a slight modification of the flooding method (alternate flooding and draining the land without letting the water stand for long periods as is the present practice) might increase the leaching effectiveness.

Asparagus growers in the organic soil of the delta attempt to manipulate the soil in late winter so as to cause the asparagus to start early and meet the early high price market. Soil temperature is believed to be the main factor and experiments under this project have shown that asparagus can be brought on earlier by raising soil temperature with plastic mulches. Plastic mulches were expensive and harvesting was difficult if plastic were to remain intact and soil temperatures maintained. During the winter, the deep soil temperature is warmer than the surface soil and the atmosphere so heat flows upward to the surface. This situation is reversed later in the year. If more were know about when this reversal takes place and how the soil temperature profile changes during this time, it might be possible to manipulate early spring temperatures by appropriate tillage methods. (Fluff up surface to insulate, compact to increase heat conductivity, remove soil to create shallower soil profile) Soil temperatures from $\frac{1}{2}$" down to 4' were measured and recorded throughout the year. No clear cut date of heat flow reversal is indicated by this data for the 1963-1964 winter but all depths were not instrumented during the first part. The reversal appears to have taken place in early January. The one foot depth was the coldest part of this profile through most of the winter. This was unexpected and will be carefully checked during the 1964-65 winter. No firm conclusion can be drawn without at least one more seasons data.

The measurement of the elevations of Lower Jones, Mildred and Bacon Islands along a traverse set up in 1922 by Walter W. Weir, Drainage Engineer (now Emeritus), California Agricultural Experiment Station, has continued under this project. The rates of subsidence and present elevation of the islands of the delta is of concern to the owners and is important to government agencies planning works and changes in the delta area. In 1964 the average elevation below sea level were as follows: Lower Jones Tract, 12.92 ft.; Bacon Island 14.08 ft.; Mildred Island 12.36 ft. The average rate of subsidence of all three islands for the period 1958-1964 is substancially less than the average rate for the period 1938-1961. It is too early yet to tell if this is a permanent situation because of the erratic nature of subsidence of these islands over short periods. Techniques of measurement and calculation were improved this year resulting in more dependable surveys. The rates of subsidence on an island were found to be far from uniform along the line of traverse. On Lower Jones, the rate of subsidence since the last survey in 1961 was about 0.4 ft. per year in the northern half but only 0.08 ft. per year in the southern half. On Mildred the rates were 0.10 ft. per year on the northern protion and 0.17 ft. per year on the southern portion. The significance of these differences in rate are not fully understood. On Jones, the low rate was associated with continuous asparagus while the high rate was on ground removed from asparagus and planted to milo for the period. On Mildred, the lower rate appears to be associated with a higher water table. An increased understanding of the factors affecting subsidence could lead to changes in organic soil

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management aimed at minimizing subsidence.

In addition to measuring gross changes in elevation of certain islands, the study of subsidence at different levels of the soil profile begun late in 1962 and were continued. While both the undisturbed and reconstituted profiles showed a rate of surface subsidence of the order of 3/4" to 1" during the year, the relative movements of the various portions of the profile were grossly different, particularly on expansion due to a rise in water table. It is clear that for meaningful information to be obtained by this technique, undisturbed natural profiles must be used. While the rate of surface subsidence over most of the year was 1" per year, net yearly subsidence was only 0.4" per year due to an expansion of the profile when the water table was raised. Either of these two rates is considerably less than the 2" to 2½" per year measured on the three islands mentioned above. This may be due either to a decreasing soil density which has not yet reached equilibrium or to a subsidence of the 5' level which has been the datum for these measurements. A planned deeply planted permanent bench mark at the site should resolve this dilema.

6. WORK PLANNED FOR NEXT YEAR

1. Continued monitoring of dust storms.

2. A further study of the soil problems associated with mechanical asparagus harvesting. Particularly a test of the feasibility of periodic sprinkling to minimize destruction of soil structure. Rates and timing of sprinkling, compatability with mechanical harvesting, soil structure changes, wind erodibility will be studied.

3. An increased emphasis on research on subsidence, particularly the establishment of additional permanent bench marks and more detailed surface elevation measurements relating rates of subsidence to cultural practices.

4. A further study of flood leaching if a suitable cooperator can be found.

5. Continued study of the soil temperature profile of organic soil with emphasis on winter and spring changes. A portable soil temperature profile probe is being constructed to measure temperatures under various cultural practices and find how such measurements relate to "early" asparagus.

7. PUBLICATIONS.

None

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