

POTATO WATER AND FERTILITY MANAGEMENT

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The amount of irrigation water required to maintain optimum soil moisture in potatoes depends upon several factors. Among these factors are: stage of growth of the potato plant, length of day, temperature, wind, percent of field capacity maintained, etc. The amount of water applied and the resultant percent of field capacity maintained was determined on a number of fields in the Columbia Basin of Washington and Oregon in 1971. The results of these determinations are shown in charts 1 to 4. To summarize, for the months of May, June, July and August the amount of irrigation required to maintain 75% of field capacity was .16, .27, .37 and .37 inches per day respectively. The charts also indicate the different water requirements to maintain different levels of field capacity. For example, for the month of July about .26 inches of water applied per day would maintain the moisture level at 40% of field capacity, but .39 inches of water per day was needed to maintain 80% of field capacity.

The amount of daily moisture needed on several potato fields in three areas (Moses Lake, Connell, and Pasco) this year to maintain optimum moisture level for potato growth is graphed in figures 5 to 7. At Moses Lake for example, only about .04 inches of water per day was required to maintain an optimum moisture the first week in May. The water requirement gradually increased to about .36 inches per day for the July-August periods. The requirements for individual fields varied substantially because of the factors mentioned above. Water applications in excess of these requirements leaches nitrogen and some other plant food nutrients, and reduces potential yield and quality.

The amount of nitrogen fertilizer needed to produce maximum yields of potatoes varies from field to field. The main factors determining amount of nitrogen to apply are: amount of carry over nitrogen in the soil from previous crops, harvest date, yield goal, amount and type of crop residue, and irrigation practices.

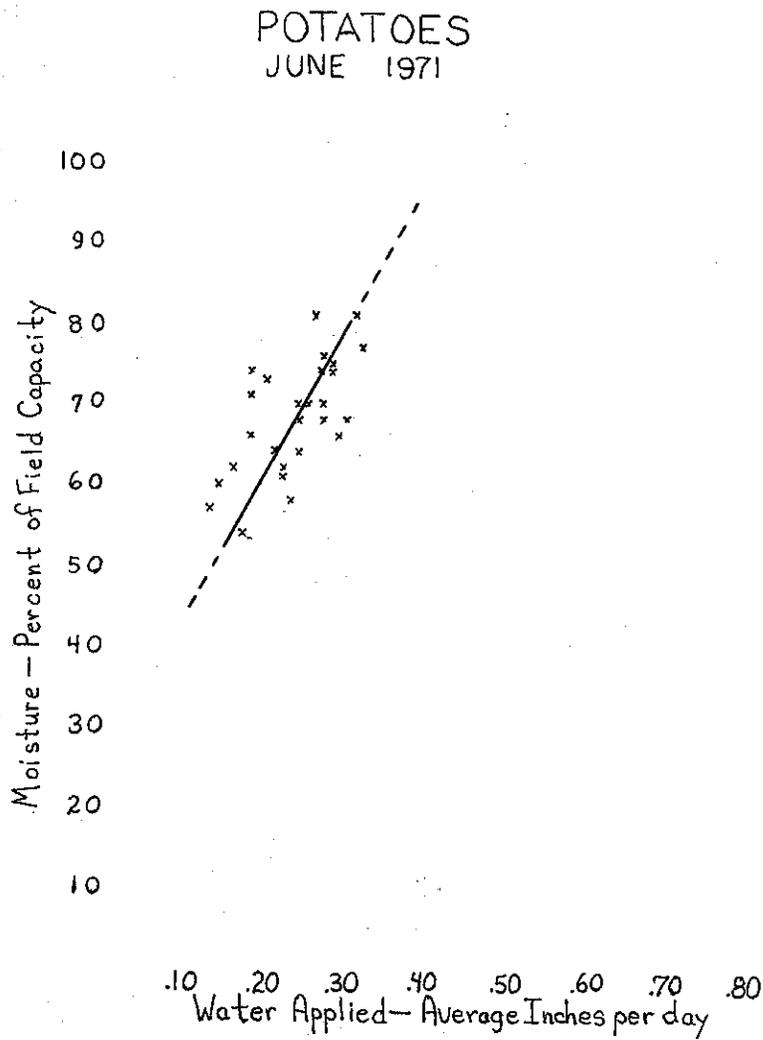
Nitrogen requirement guides for early and late potatoes with varying profile nitrogen contents and yield goals are given in figures 8 and 9. For the purpose of calculating total profile nitrogen from soil tests the sub soil nitrogen levels are pro rates at the deeper soil depths. For example, for late potatoes with a pro-rated soil test of 100 lbs. of nitrogen in the soil in the form of nitrate, ammonia, and estimated organic matter release, it will require about 310 lbs. of fertilizer nitrogen to produce a 30 ton yield. This assumes a maximum efficiency of nitrogen use with a minimum of leveling.

A more realistic approach than above is to have available to the potato plant the optimum amount of nitrogen for each stage of growth. Our experience shows this optimum amount to be about 250 lbs. of nitrate plus ammonia nitrogen per acre during the seedling stage. Then the optimum gradually declines to about 100 of nitrogen by July 15. A carry over at harvest of about 70 pounds of nitrogen has produced maximum yields. A carry over of less than 70 pounds nitrogen depresses growth at the end of the growth period. A carry over of much more than 70 pounds promotes excessive vegetative growth at the expense of tuber yield.

The concentration of nitrogen in the petiole is a valuable guide in evaluating the fertility status of the growing potato crop. Concentrations of about 32,000 ppm nitrate nitrogen appear optimum early in the season. A gradual decline down to 1,000 to 2,000 for late August or September harvest has produced satisfactory yields of high quality.

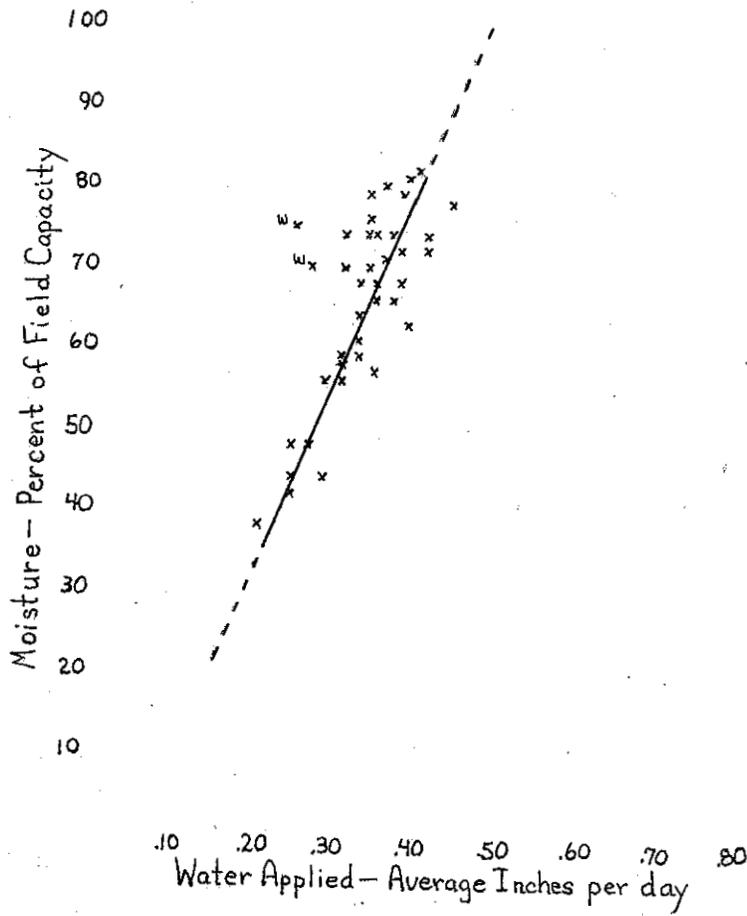
Our experience has shown that if moisture levels are maintained at 70 to 90 percent of field capacity and the soil and petiole nitrogen levels are maintained at the levels indicated above, high quality yields in excess of 32 tons per acre are

not unrealistic. An example of moisture and fertility logging for potatoes from May through August showing optimum levels of soil moisture, soil nitrogen and potato nitrates is shown in figure 10.



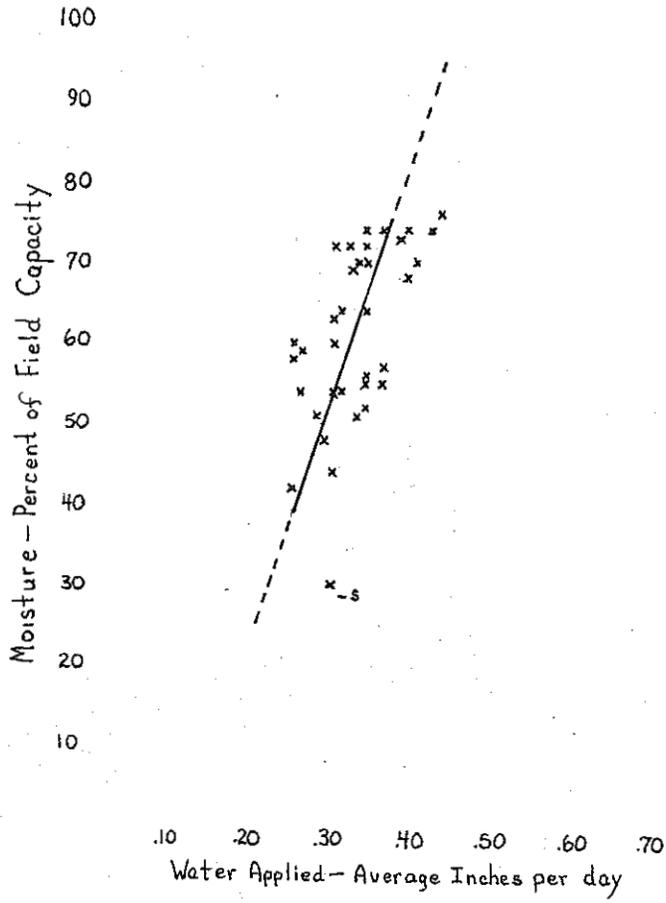
(Figure 1)

POTATOES JULY 1971



(Figure 2)

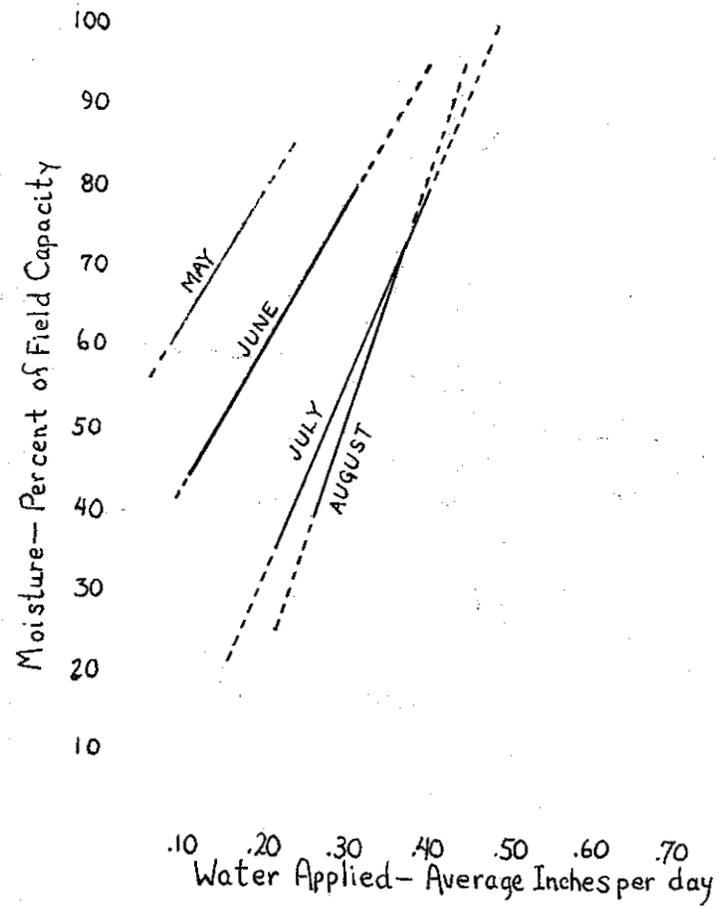
POTATOES
AUGUST 1971



(Figure 3)

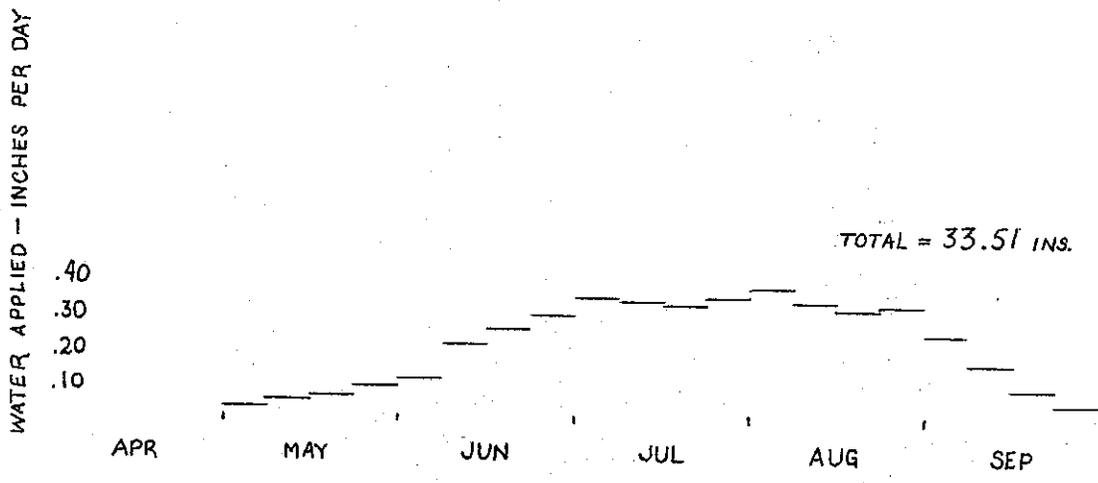
POTATOES

MAY - AUGUST 1971



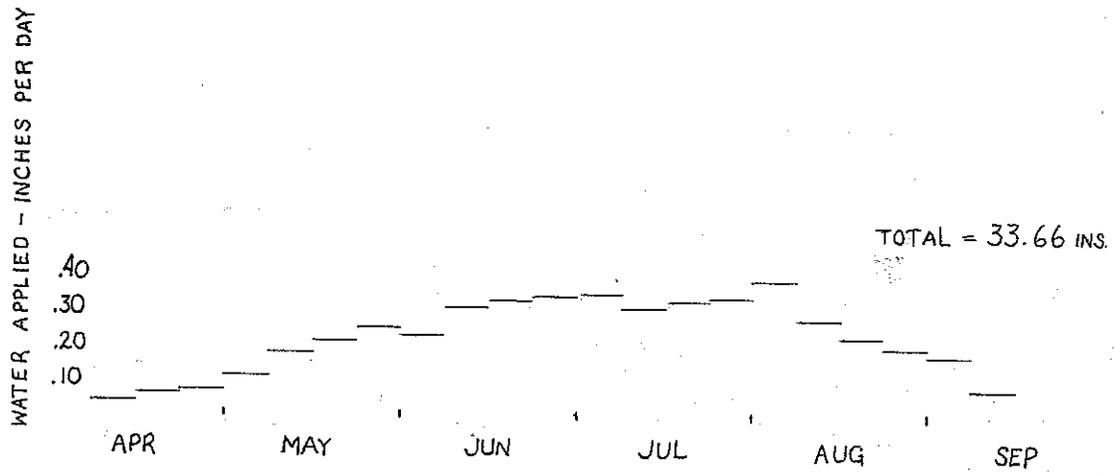
(Figure 4)

WATER REQUIREMENT FOR POTATOES MOSES LAKE 1971



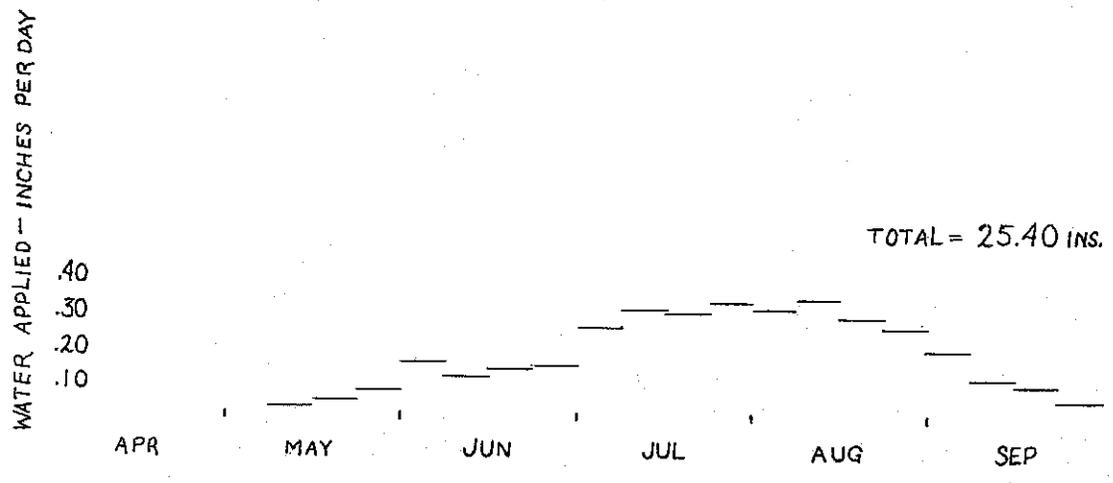
(Figure 5)

WATER REQUIREMENT FOR POTATOES PASCO 1971



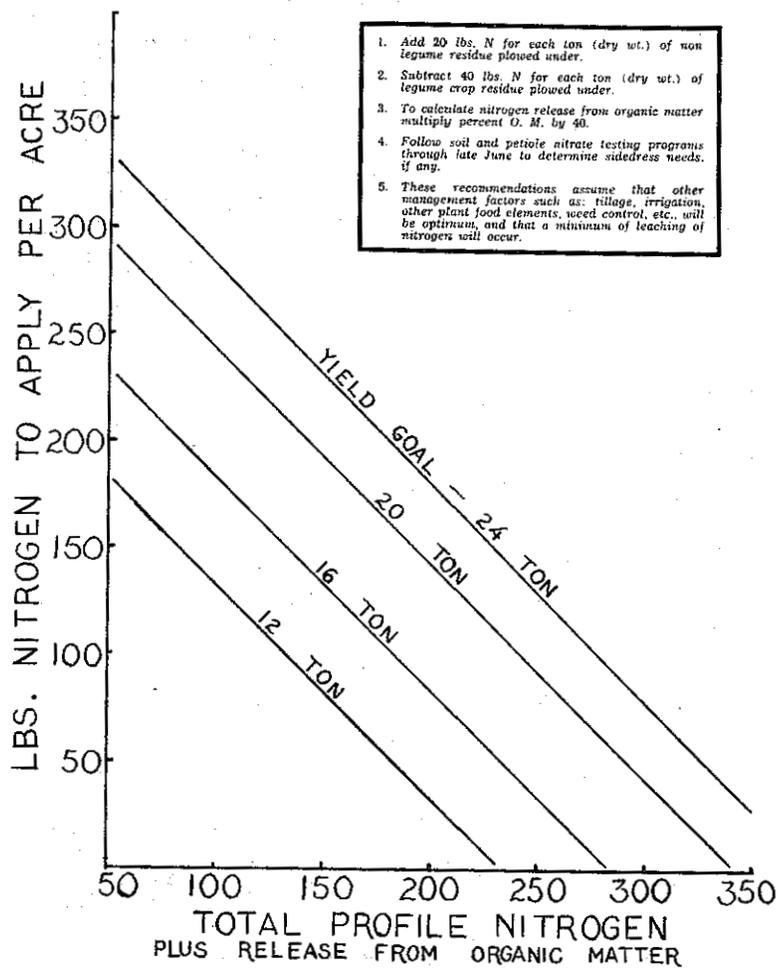
(Figure 6)

WATER REQUIREMENT FOR POTATOES CONNELL 1971



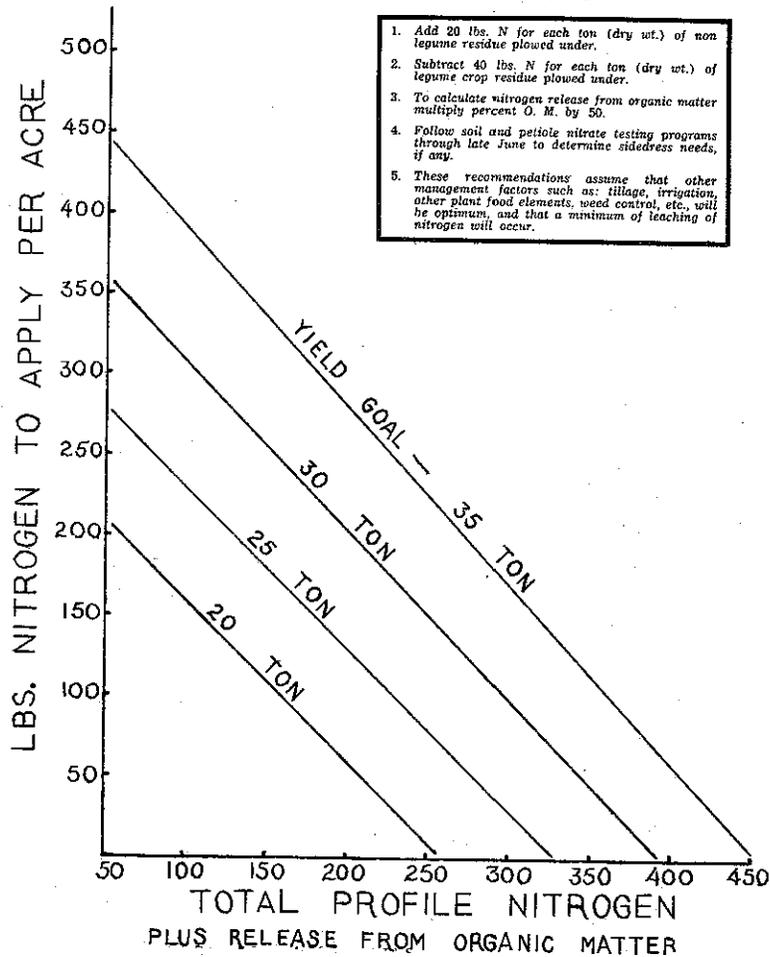
(Figure 7)

NITROGEN FOR EARLY POTATOES



(Figure 8)

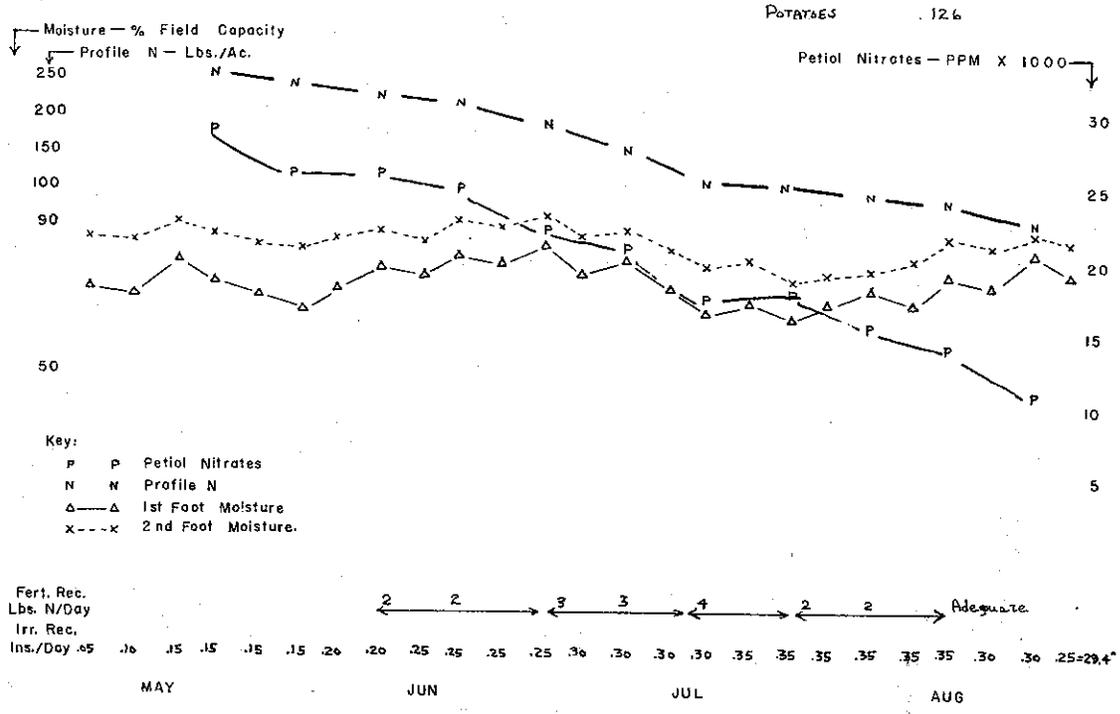
NITROGEN FOR LATE POTATOES



(Figure 9)

MOISTURE & FERTILITY LOGGING - POTATOES

CIRCLE 18



(Figure 10)