UNTREATED potato plant, left, shows effects of psyllid yellows on top growth, also has poor tuber set. Contrast it with treated plant at right, with its healthy foliage and good tuber set.

Potato Research Is Spurred by Growing Acreage

W. D. Pew and Paul D. Gerhardt

Sharp increases in potato acreage in recent years indicate the immediate trends and importance of this crop in Arizona's vegetable industry.

In 1959-60 the state's total area devoted to potatoes was 9,713 acres. To illustrate the trends in production, in relation to the ultimate use of the potatoes, this acreage is divided as follows: red varieties for fresh market, 6,321 acres; white varieties for fresh market, 826 acres; varieties for processing—chiefly chipping—2,566 acres. It is estimated there will be a 15 to 20 percent increase in 1961 over last year's acreage, and almost all of this will be production for processing.

(*Continued from preceding page*)

greatly reduced. If the source cannot be eliminated, then still other means of control must be investigated.

Mosaic Not Sole Cause

These investigations indicate that the two mosaic viruses, alone or in combination, are not wholly responsible for crown blight. It is apparent that these diseases can reduce yields, but careful comparisons of healthy and diseased (mosaic) cantaloup plants, both in greenhouse experiments and field cage experiments, have failed to show any correlation between mosaic diseases and any of the many symptoms described for crown blight.

Effects of Certain Chemically and Mechanically Mixed Fertilizers on Yield and Tuber Size in Red Pontiac Potatoes

Treatment		Commercial Sizes or Grades			
		US No. 1A	US No. 1B	US Jumbo	
No.	Material	Number of 100 lb. Bags Per Acre			Total Marketable
1	No Fertilizer	129	20	1	150
2	Ammonium Nitrate÷ N. P. K.	201	9	4	214
3	20-10-0	207	14	3	224
4	10-10-0*	231	14	9	254
5	10-10-10*	213	11	10	234
6	16-20-0	230	16	22	268
7	16-48-0	252	17	6	275
8	11-48-0	259	18	18	295

*Mechanically mixed fertilizers.
÷Equivalent to 33-0-0

Although considerable research has been done with fresh market potatoes, chiefly in the phases of nutrition (fertilization), insect control, irrigation and quality control, little has been done in the production and handling of processing varieties.

Nitrogen, Phosphorus Value Proven

An appropriate review of the most recent work would require a comment on all the phases of production just mentioned. In the past, in trials with fresh market potato varieties, fertilization research has received the greatest effort. Findings from these tests point up the vital role of nitrogen and phosphorus in a fertilizer program. The importance of potash is not so clearly developed. At this point its use in fertilizers for this crop is questionable. In fact, the need for continued caution and a thorough understanding of potash is evident from these data.

In recent studies, nitrogen and phosphorus have each been applied at rates of 60, 120 and 240 pounds per acre. There were definite yield increases, with increases in phosphorus rates up to 240 pounds per acre. At low levels of phosphorus (up to 60 pounds per acre) no increase in production was noted even with high levels of nitrogen. Yet, at the high levels of phosphorus, a yield response to additional nitrogen was obtained. Highest production was recorded from the treatment receiving 120 pounds of nitrogen and 240 pounds of phosphorus.

Potash was also applied to certain of the high phosphorus-nitrogen treatments. The 200 pound rate of potash, even when applied in the presence of relatively high levels of nitrogen and phosphorus, seriously reduced the yields and cut the specific gravity to a level usually considered unacceptable. In the table you can see, in treatments 4 and 5, how potash resulted in a decrease in yield. From these data it appears that potash should be used only after considerable study.

The data in the table not only illustrate the need for adequate levels of nitrogen and phosphorus, but also an appropriate ratio. Note the progressive increase in yield as the ratio of phosphorus to nitrogen widens. Although the maximum increase is obtained from the 1 to 4 ratio, the most efficient level appears to be somewhere between the 1 to 2 and 1 to 3.

Place at Seed Level

Placement of fertilizer is an important consideration. It has been found that fertilizers for potatoes should be placed approximately at seed level and 3 to 4 inches to each side. Placing the fertilizer 3 to 4 inches to the sides and either above or more than 2 to 3 inches below the seed piece rendered it relatively ineffective. Fertilizers banded at deeper positions were almost totally ineffective.

Tests involving soil moisture levels show that, for the most part, irrigations in commercial fields are applied too frequently for best results. Maintaining the soil moisture at approximately field-holding capacity, the common commercial practice, not only cuts yield, but also reduces specific gravity and dry matter, causes large unsightly lenticels, and adversely affects shipping quality. Doubling the usual time between irrigations would do much to improve potato production and quality.

It has recently been found that the two major potato insect pests can be effectively controlled by a single application of phorate (commercially marketed as Thimet) applied in either of the fertilizer bands at planting time. This material not only controls potato psyllids and green peach aphids, but also thrips and leafhoppers.

Phorate, a systemic insecticide is relatively ineffective on potatoes until activated by the first post-planting irrigation and absorbed by the plants.

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