Irrigation Program Important To Root Growth of Potatoes

W. D. Pew and James H. Park

Perhaps the greatest challenge to growers producing potatoes in the semi-arid (low rainfall) areas of Arizona is that of a proper water supply to maintain the most ideal soil moisture level throughout the growing season.

Although several factors are important in the production of this crop, none is more interesting or produces so pronounced an effect on plant growth as does irrigation. In these areas of Arizona, the production of potatoes, as well as other crops, is impossible without supplemental water. Beyond this generalization of water needs is the fact that a certain knowledge and understanding of the principles of irrigation is imperative if potatoes are to be grown with maximum efficiency and effectiveness.

Can Use Too Much Water

All too often growers have unknowingly reduced yields and lowered the quality of potatoes by excessive use of irrigation water. These findings have been repeatedly verified through careful field and greenhouse testing.

Considering the differences in yield between individual treatments within and between the three general groups listed in our table, one quickly observes that when plants receive a high level of moisture early in the growing season, followed by a reduction during the later period when the tubers are enlarging rapidly and maturing, the yield is rather sharply reduced.

This is readily seen in comparing treatments 1, 2, and 3. Note the progressive reduction in yield as the soil moisture levels are lowered in the latter part of the growing period. In group C (treatments 7, 8, 9) the opposite trend is true. Where the plants are started and grown under drier soil moisture conditions and then provided a greater amount of water as the tubers are developing and reaching maturity, yields progressively increase as the level of soil moisture is increased.

It also will be noted that in group B the yields are essentially the same for all treatments regardless of the level of moisture during the last part of the growing season. This indicates that the root system is adequate to compensate for higher or lower levels of moisture variations as they occur.

Affects Roots the Most

Observations taken concerning both tops and roots in these tests indicate that the effect of varying water regimes on yield is more closely associated to depth and volume of root growth than differences in top growth. High levels of moisture early in the season result in limited, shallow root systems which are incapable of adjusting to conditions of lessor amounts of soil moisture later in the season.

Since the roots thus developed are too localized and shallow, they are unable to use water in the deeper zones. Consequently, once the plants are started under high soil moisture levels, they must continue at these levels if adequate yields are to be obtained. Whereas, plants grown on a more limited water supply in the early periods and then provided with more liberal quantities later are, because of better root development, better able to withstand the changes and can use the available soil moisture more effectively.

Quality Lower, Too

Tubers produced on plants grown in soils of high moisture were generally of poorer quality than where they received smaller amounts of water. The measure of poorer quality was

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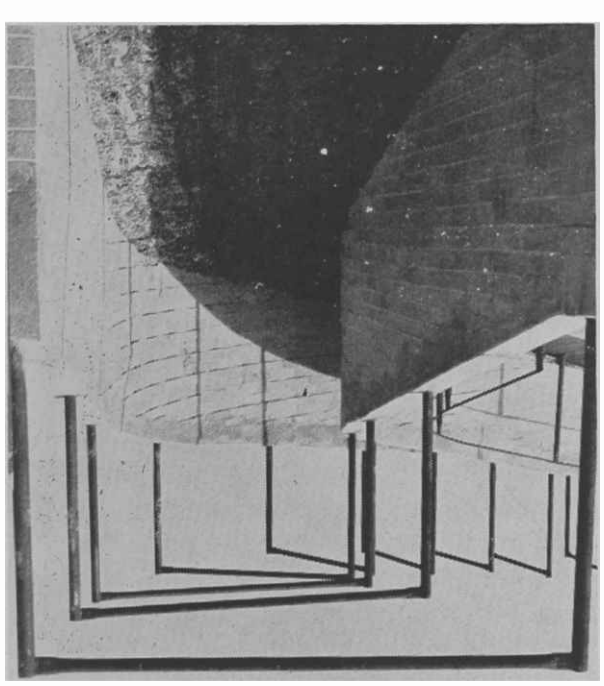
This is third in a series of articles on potato culture by these authors, appearing in Progressive Agriculture.

Effects of Variation of Soil Moisture Levels on Potato Yield (Variety: Red La Soda)

Group	*No.*	*Treatment Description*		*Yield CWT.*	*Number of Irrigations*
		Soil Moisture			
		Early Season	**Late Season**		
A	1	Very Wet	Very Wet	338	15
A	2	Very Wet	Wet	328	13
A	3	Very Wet	Dry	321	11
B	4	Wet	Very Wet	348	13
B	5	Wet	Wet	348	9
B	6	Wet	Dry	343	9
C	7	Dry	Very Wet	416	11
C	8	Dry	Wet	391	9
C	9	Dry	Dry	345	6

Very Wet = 18-20 centibars; Wet = 45-50 centibars; Dry = 75-80 centibars

This Picture Truly Mysterious



This entry in our "mystery picture" series may really confuse you. Nothing but a series of lines, angles and a heavy black shadow at the top.

A little study and contriving, however, should give you an easy solution.

Or you can just turn to Page 18 and read the answer.

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based on lower total solids, more watery tissue, poorly set skins, rough and poorly shaped tubers, and enlarged and unsightly lenticels.

The economics involved in the application of these findings also is important. Consider for a moment the number of irrigations required in each treatment as a measure of production efficiency. As an appropriate comparison, use Treatment 1 with 15 irrigations and No. 7 with 11 irrigations. The data show that the plants in Treatment 7 yielded 78 CWT. sacks more than those in Treatment 1 and yet the increased production required four fewer irrigations.

Thus, not only was the yield increased, but production costs simultaneously were reduced. *These findings are of considerable economic value — especially on crops normally high in production costs — if the growers are to receive highest financial returns.*

This Can Mean Money

Based on these findings, growers should be especially careful concerning their irrigation program. It should be remembered that high initial levels of soil moisture, followed by drier soil conditions, will result in reduced yields. The reverse of these soil moisture conditions will give highest yields and best quality tubers.

Where continuously high moisture levels are maintained in an attempt to overcome the effects of poorly developed root systems, in an attempt to obtain good yields, quality usually is impaired. Plants grown on intermediate levels of moisture early in the growth period produce relatively good yield regardless of irrigation practices later in the growing period. Generally, however, more control on yields can be exercised throughout the growing season if plants are given a limited supply of water rather than larger amounts early in the growth period.

Range Managers Honor Jim Finley, Carl Webb

M. Carl Webb, Miami rancher, received a double honor from members of his profession at the winter meeting of the Arizona Section of American Society of Range Management in Nogales, Ariz., January 20.

Webb was named "Rancher of the Year" and also was elected councilman south by the organization. The "Rancher of the Year" award was presented to him by Nelson K. Stevenson of Phoenix, chairman of the awards committee.

At the same time, James L. Finley of Gilbert, Maricopa County, received the organization's "Special Service Award." Finley is a past president of the organization and has devoted many years of service to it.

Gil Beck President Of Range Managers

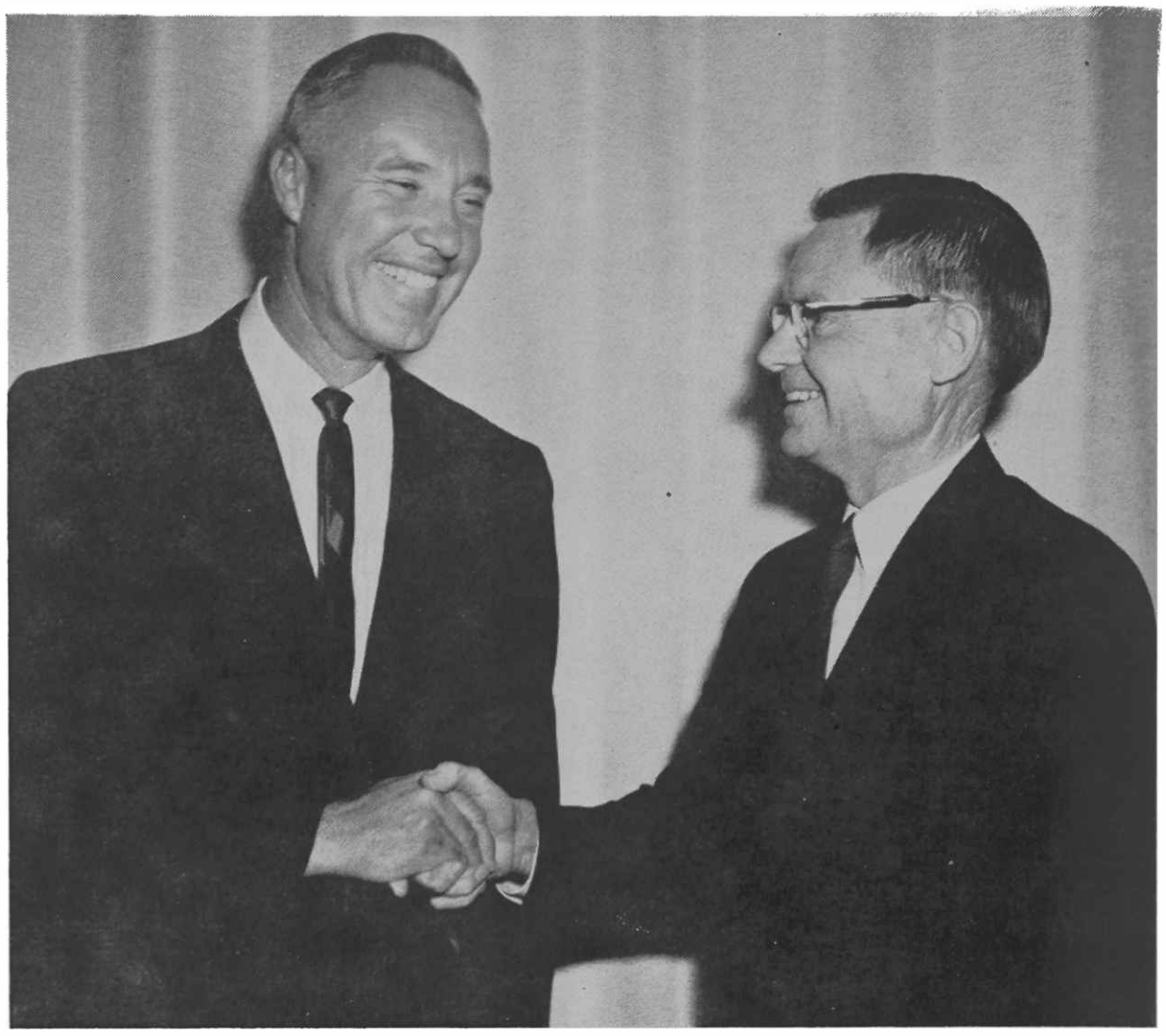
Gil Beck of Phoenix, chemical engineer turned rancher, is new president of the Arizona Section of the American Society of Range Management.

He was elected at the organization's winter meeting in Nogales, Ariz., January 20.

Elected to serve along with Beck were R. M. Housley, Forest Supervisor of the Coconino National Forests, Flagstaff, vice president; William H. Beck, Range Conservationist for the Bureau of Indian Affairs, Hopi Indian Agency, Keams Canyon, councilman North; and M. Carl Webb, Miami rancher, councilman south.

As the new president, Webb succeeds Robert G. (Pat) Gray, agricultural agent in Gila County.

Whither the Colleges of Agriculture?



"Whither the Colleges of Agriculture?" was the subject which Dr. Dan Aldrich (left), Chancellor of the University of California, talked about recently on the U of A Campus.

Welcoming Chancellor Aldrich to the U of A Campus is Dr. Harold E. Myers (right), Dean of the U of A College of Agriculture. Dr. Aldrich emphasized that our colleges of Agriculture face "magnificent opportunities in helping to produce enough food and fiber to supply the nation's exploding population in the years ahead."

But, he noted, all branches of colleges of agriculture — agricultural extension service, resident instruction and agricultural experiment station — face challenges in addition to food and fiber production. The fast-growing population and the growing scarcity of land, he said will bring added emphasis on resource development in its broadest sense. In the past, he explained, resource development was guided strictly by the market place.

"Today, we must change our definition of resource development to include **all** land and water uses, and we must consider how farmers and city people can live together," said Chancellor Aldrich.