

TIMING FINAL IRRIGATION FOR HIGHER YIELDS OF NO. 1 POTATOES



Agricultural Extension Service
Agricultural Experiment Station
College of Agriculture ☆ University of Idaho

MAR 2 1965

UNIVERSITY OF IDAHO

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The last irrigation of your Russet Burbank potatoes is a very important one. It should be timed so the water is off the crop two or three weeks prior to the first frost or vine killing operation. In the upper Snake River Valley this is between August 20 and August 28. In the Magic Valley this would be the first week in September. In the Boise Valley irrigation can end as late as September 15.

Water requirements of the potato slacken considerably about 100 days after planting. Research at Idaho's Aberdeen Experiment Station shows 1.5 acre-inches of moisture is all the plant requires from 100 days until harvest. In a medium textured soil that is 2 feet in depth, at least 2.4 acre-inches of water remains for the plant to use when the soil moisture level drops to 40% of available capacity. The average consumptive water use of potatoes over the 3-year period 1960-1961-1963 is shown below.

Tuber development begins about 60 days after potato planting and the growth rate is the highest from 65 to 80 days. Eighty-eight percent of the total yield is put on in the first 100 days. Only 12% of the total yield is added later. This all-important remainder of the crop is not jeopardized by the recommended last irrigation date. An irrigation at this time will provide the soil with moisture to keep the potato growing until harvest. Average cumulative tuber development for the 1960-1961-1963 period at the Aberdeen Experiment Station is shown below.

Risk of Pointed Ends and Bottlenecks. Potato tubers are not as susceptible to malformation late in the growing season as they are earlier. During late August and September no increase in malformation has been found in research tests. Total yield and tuber shape are not jeopardized as many growers have been lead to believe.

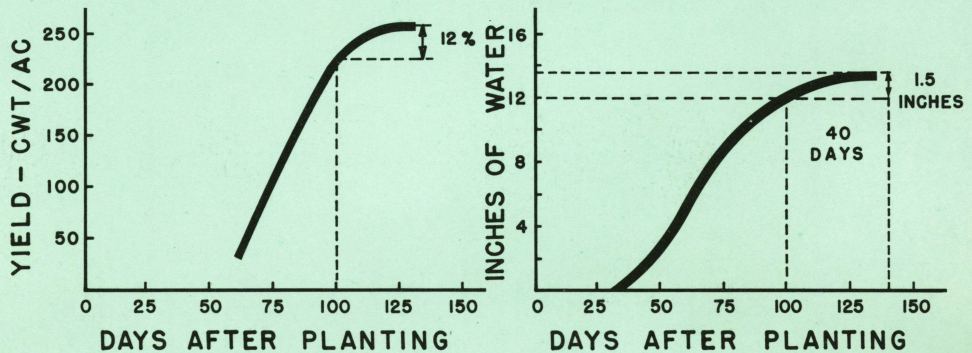


Fig. 1. Average cumulative potato tuber development and consumptive water use at the Aberdeen Experiment Station 1960-1961-1963.

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THE ADVANTAGES OF TIMELY LAST IRRIGATION

Yield of U. S. No. 1's Increased. The Potato Processors' Association and the University of Idaho Extension Service have conducted cultural practice surveys since 1961. In 1963, the survey covered over 15,000 acres. Figure 2 shows the average 3-year effect of the last irrigation date on total yield and U. S. No. 1 yield at harvest. This survey demonstrates that growers increased

yield and quality when irrigation was discontinued at least two to three weeks before frost.

Less Mechanical Injury at Harvest. The last irrigation date also affects harvest injury. Tests at Aberdeen in 1955 are shown in Table 1.

Harvest injury index increased 85% and specific gravity decreased with late irrigation. Properly timed final irrigation increases maturity, hardens the skin, and allows the potato to stand rough handling with less injury.

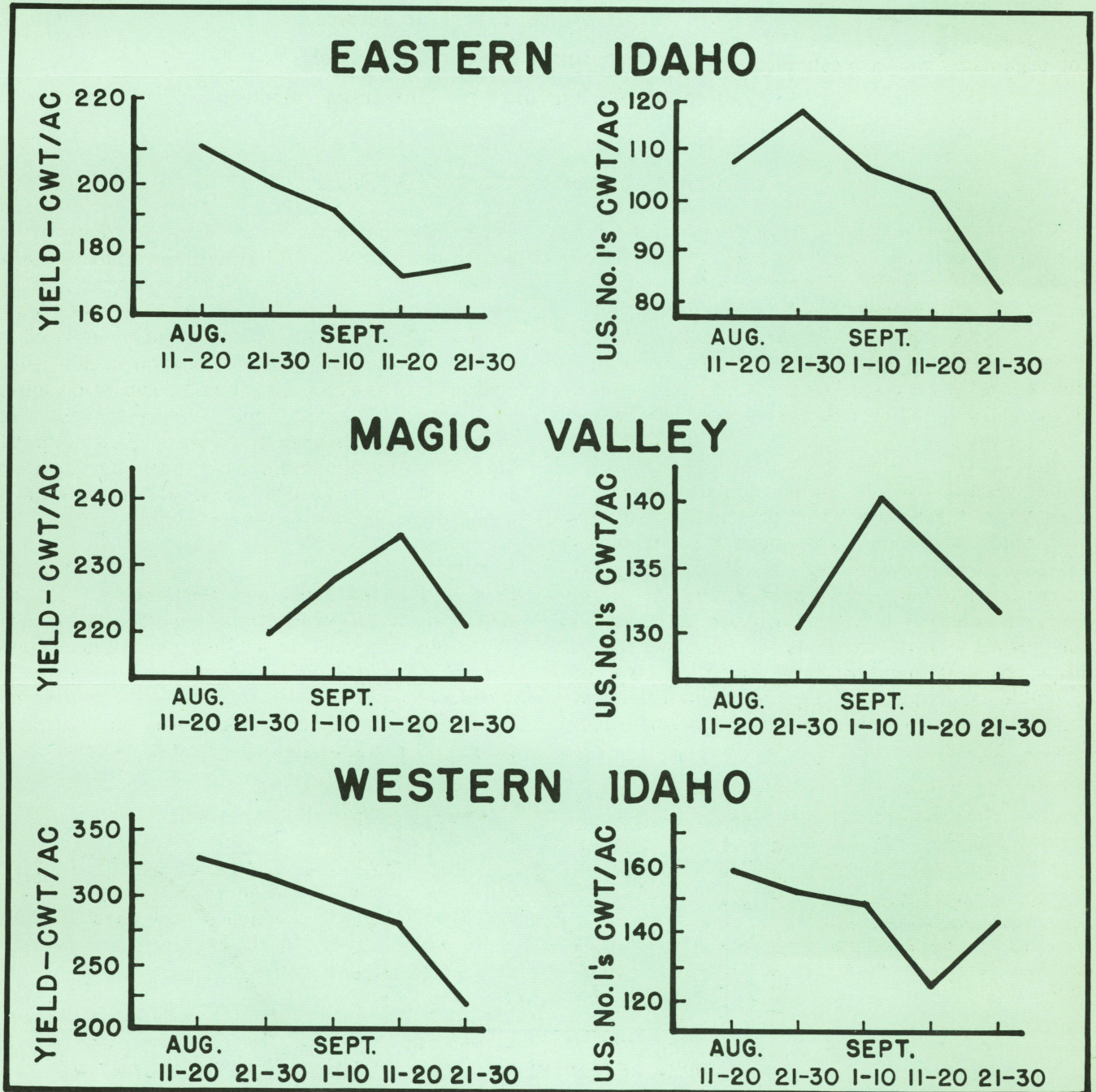


Fig. 2. Effect of last irrigation date upon potato yield and quality in three major Idaho potato growing sections.

Table 1. Effect of Last Irrigation Upon Mechanical Injury at Harvest

Last Irrigation Date	Injury Index	Specific Gravity
August 10	388.6	1.0857
August 22	618.2	1.0848
September 2	716.9	1.0805

Less Storage Loss. Reduced mechanical injury means a sound high-quality potato for storage. Uninjured tubers store well with little loss. Injured tubers require special care and loss is usually high. In two-thirds of all rotten tubers examined in storage, the avenue of entrance for the rot organisms was a mechanical injury. Figure 3 shows the severity of loss each type of injury suffers in storage.

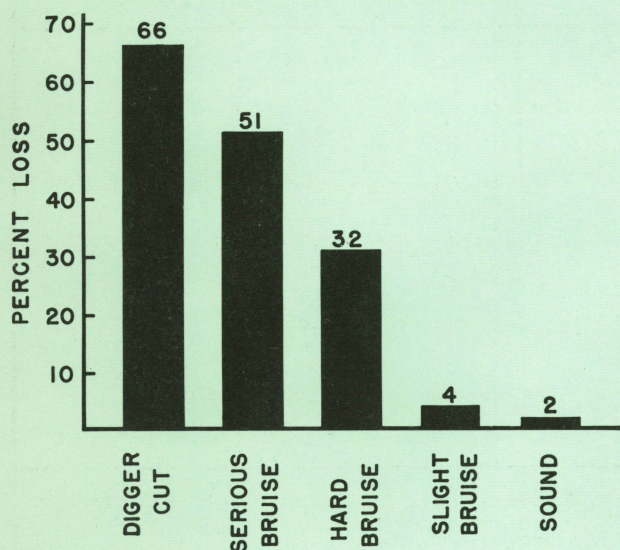


Fig. 3. Effect of harvest injury on storage losses. For example, 51% of the potatoes with serious bruise were lost in storage while only 49% were saved.

Quality Is Improved. Timely final irrigation hastens maturity, increases specific gravity, and cooking quality. Research has shown specific gravity can be increased by timing irrigation as shown in Figure 4.

USDA research on French-fried potatoes shows that as specific gravity of the raw potato rises, color, crispness, mealiness and flavor are improved. In the actual processing of the raw product, as the specific gravity increases the cooking time is reduced, the oil content decreases and the yield of finished product increases. Table 2 illustrates these benefits.

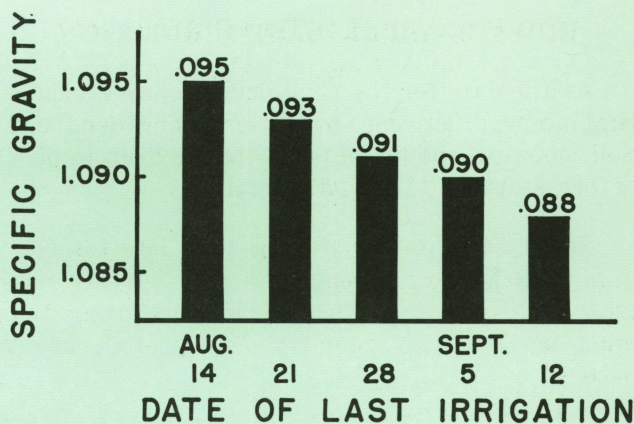


Fig. 4. Effect of final irrigation upon specific gravity.

Helps in Vine Killing. If the available soil moisture is above 50 percent and the vines are killed quickly without killing the roots, the roots continue to absorb water. This decreases specific gravity. Timely termination of irrigation will help mature the tubers as well as help prevent a loss in specific gravity when the vines are killed.

Table 2. Influence of Specific Gravity of Raw Tubers on French-Fried Potatoes

Specific Gravity	French-fry		
	Cooking Time	Oil Absorbed during cooking	Yield
	Minutes	Percent	Percent
1.060	4½	13.6	46.8
1.070	4½	13.8	48.5
1.075	4½	13.4	49.6
1.085	4	12.5	50.7
1.090	4	12.2	51.1
1.095	3½	11.8	52.9
1.100	3½	11.9	53.7
1.110	3	11.3	55.9

Decreases Water Rot. The dangers of water rot, a disease of wet soil, are reduced by ending irrigation well before frost. When the vines cover the row and fall down in the furrow, furrow irrigation is very difficult. The heads of the furrows are over-irrigated in the attempt to push the water through. When water requirements of the plants taper off, the soil stays wet longer, and the danger of water rot increases.

Water rot creates serious storage problems. In a recent research trial storage lots which contained 1% water rot infected tubers had 30% more rot after storage than potatoes having no water rot.

HOW TO APPLY LAST IRRIGATION

As the date for the final irrigation approaches the interval between irrigations lengthens out. Soil moisture should be permitted to drop to 65% before starting to irrigate again.

Select the right final irrigation date for your area. Since it may require 5 to 7 days to irrigate a field with sprinklers, the last irrigation must be fitted in around the suggested cut-off date.

The last application of water should recharge the entire root zone with moisture. The soil profile should be wet down two feet. Sandy soils with low water holding capacities may require another irrigation.

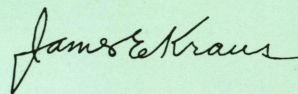
To facilitate harvest, a conditioning irrigation may be necessary. This isn't hazardous. Once the tuber is mature, the lenticels close and the door is shut to water rot organisms.

Table 3. Fifty Percent Probability of Freezing Temperatures Occurring Before Specified Dates at Selected Idaho Stations

Station	32°F. or Lower	28°F. or Lower	Station	32°F. or Lower	28°F. or Lower
Ashton	Sept. 11	Sept. 24	Malad	Sept. 24	Oct. 15
Aberdeen	" 16	" 28	Blackfoot	" 25	" 9
Preston	" 18	Oct. 3	Caldwell	" 27	" 12
Shoshone	" 20	" 1	Parma	" 27	" 12
Idaho Falls	" 23	" 6	Jerome	" 29	" 14
Gooding	" 23	" 5	Weiser	Oct. 1	" 16
Burley	" 23	" 8	Pocatello	" 2	" 17
Oakley	" 24	" 7	Emmett	" 5	" 19
Twin Falls	" 24	" 8	Boise	" 18	" 23

The U. S. Weather Bureau has compiled frost probability tables for a number of Idaho stations. Each of those shown above have 30 years of record. They are read as follows: At Idaho Falls, for example, there is a 50% chance of the temperature of 32°F. or lower occurring before September 23, and also a 50% chance of a 28°F. or lower temperature occurring before October 6.

IDAHO AGRICULTURAL EXTENSION SERVICE—IDAHO AGRICULTURAL EXPERIMENT STATION—
COLLEGE OF AGRICULTURE, UNIVERSITY OF IDAHO, MOSCOW, IDAHO. PRINTED AND DIS-
TRIBUTED UNDER PERMIT NO. 1011 AND ACTS OF CONGRESS, MAY 8 AND JUNE 30, 1914



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