Growing Potatoes with the Irrigation Leader

Introduction

Potatoes are the world's most important vegetable crop, and the fourth-largest food crop, following maize, wheat and rice in acres planted. Originating in the South American Andes Mountains, this new world crop is sometimes called "Irish potatoes" or "white potatoes" to differentiate it from yams or sweet potatoes, and since the Irish were the first to import the crop into the US in 1719.

Several species comprise the 100 or so varieties of potatoes, with various numbers of chromosomes and presenting an array of characteristics. This diversity has led to the development of genetic lines suited to specific climates and end uses, including various day-length adaptations (from tropical to temperate) and target markets (fresh-pack, or table-ready varieties vs. processor-adapted varieties).

Production Considerations

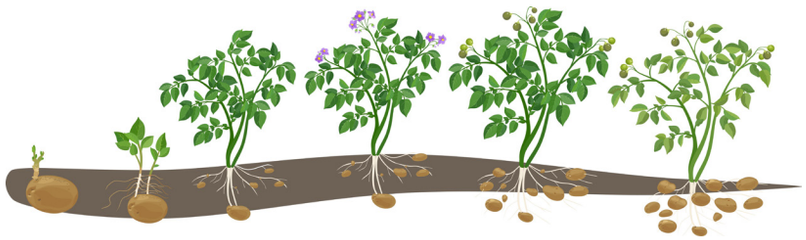
Before making significant investment into commercial potato production, there are several questions to be discussed and resolved, including how suitable the soil, climate and water supply are; what type of market is targeted (fresh vs. processed vs. seed stock); available storage and transportation infrastructure; and management expertise.

Agronomic issues

Seed and plant selection

Variety selection is an important issue. As the crop has moved and adapted to different climates, varieties adapted to specific latitudes (day lengths), environments and uses have been developed. Expected length of storage is also a factor, since some varieties degrade more quickly in storage.

Processor demand, especially for French fries, is the largest single market segment, but individual producers may have different needs. Depending on end use, various composition factors may be important in selecting varieties. This includes percent solids, chemical composition of starch, specific gravity, taste, mouth feel, uniformity of skin and uniformity of tuber size. Agronomic considerations such as length of growing season, disease resistance and ease of harvest are also important.



Tillage and planting

Tillage needs vary depending on soil and climatic conditions. Potatoes can be grown on a variety of soils, but each soil type will dictate a specific regimen of cultural practices to optimize crop production. Weed control, water content, soil structure and organic matter content are all affected by tillage choices. Generally, soil temps between 7° C (45° F) and 21° C (70° F) are desired for planting.

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To maximize dry matter production, early planting is generally preferred. However, it may be important to time planting to achieve harvest at a desired market interval, in order to maximize income. Planting population will vary with standard row width of equipment, and desired outcome.

Increasing row width and/or in-row plant spacing encourages production of larger tubers, which may be desirable for table use. Smaller tuber size may reduce knobs, cracks and hollow heart, leading to improved quality. Similarly, planting depth may be altered to account for issues such as time to emergence, tuber quality, potential for sunburn and minimizing soil ingestion into harvest equipment.

Pest management

Pest management is an important factor in managing the yield, quality and profitability of the potato crop. Proper use of Integrated Pest Management (IPM) practices is important to control pests while maintaining profitability and minimizing opportunities for resistance development.

Fertility

Soil testing is a critical component to proper nutrient management. Several nutrients are critical to producing healthy, high-yielding crops. Macronutrients are common to most crops: nitrogen (N), phosphorus (P) and potassium (K), as well as sulfur (S), calcium (Ca) and magnesium (Mg).

Micronutrients (those required in smaller amounts) are also important: zinc (Zn), manganese (Mn), iron (Fe), copper (Cu), boron (B), chloride (Cl), molybdenum (Mo) and nickel (Ni). Soils vary in the amounts of these nutrients present and available for plant uptake. Soil testing to determine the sufficiency of each should guide the fertility management of the crop.

Other conditions, notably soil pH, can greatly affect the availability of these nutrients to the crop. Using an effective soil testing program can be a great asset in planning and applying fertilizers to optimize growing conditions.

Both excess and insufficient amounts of various nutrients, especially at sensitive growth stages of the crop, can diminish crop yield and tuber quality. Soil samples should be taken from each unique crop management zone in a field, to ensure proper treatment of each area. These zones include areas that differ, such as in soil texture or landscape position.

Plant tissue testing is another practice useful in managing a fertility program for potatoes. During the growing season, conditions arise that may alter crop nutrient status. Regular scouting helps identify these changing conditions. Plant tissue analysis, done on a timely basis, can help identify potential problems before they cause serious losses. Petiole sap testing is one method for tracking nutrient sufficiency of the crop during the growing season. This is especially useful early in the crop's development (prior to flowering).

Irrigation

Potatoes will use 450 mm (18 inches) of water or more during the growing season. The effective root depth of a potato crop is 0.6 m (24 inches) or less. It is important to accurately monitor and maintain proper soil water content.

Potatoes are sensitive to water stress, so the soil water content should be kept to at least 65% of field capacity. Potatoes do best in well-drained conditions; excessive soil water content will seriously compromise both yield and quality of the crop.

This means that optimum irrigation practice involves relatively small amounts of water, applied frequently to meet crop water needs. Proper management will include tracking crop water use (evapo-transpiration, or ET, of the crop), soil water conditions and crop growth stage to determine proper irrigation schedules for the crop.

There are various tools available for estimating ET and measuring soil water content. Managers should select the techniques and tools best suited to their field, management style and operational capabilities. Remember, good irrigation management is focused on effective, efficient irrigation.

“Effective” irrigation means that the crop gets every drop of water it needs to maximize its potential. “Efficient” irrigation means that the crop does not get one extra drop more than what is needed to maximize its potential. These definitions should include an awareness of all factors, including any leaching fraction to manage salinization, water restrictions that may exist, and system capacity.

Crop protectant

Mechanized irrigation carries an added benefit, compared to other technologies. These systems are simple to use for applying crop protectant products. For example, this means that fertilizers and fungicides can be delivered to the crop just when the plants need them the most, without disturbing the crop by driving through the field with bulky spray equipment.

Fungicides applied through center pivot irrigation systems generally achieved disease control equal to airplane application and effectively reduce early blight infection.

Weed management

Weed pressure can affect yield and quality of the crop, especially late in the season, when weed pressure can affect tuber bulking and ease of harvest.

Since potatoes are directly consumed, it is important to observe all label restrictions with regard to pre-harvest intervals and total rate of product applied. Increasing incidence of herbicide-resistant weeds makes timely scouting and the use of solid IPM principles critical.

Insect management

Again, proper IPM principles should be applied. Pivot application of insecticides through center pivots should be tied to timing and location of infestation, population level, growth stage of crop and insect, and economic threshold for treatment.

Disease management

Disease resistance can be an important genetic factor in selecting seedstock. Note that environmental conditions play an important role in disease development, both during the growing season and during extended storage. Both good and bad growing conditions can lead to increases in disease pressure, from excessively fast growth and physical damage to the tubers, respectively.

Again, good IPM practices are important. To avoid a build-up of disease-causing pathogens, rotation with other crops is an important and valuable practice.

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Harvest

In the “natural” state, potato vines begin to senesce and turn brown about the time of tuber maturation. Other causes of vine death include frost, insect infestations or dry soil conditions.

Where these conditions do not exist, especially with modern, high-vigor varieties, it may be desirable to kill the vines artificially (deliberately). This may not improve tuber quality, but it can help achieve desirable skin set, which can reduce the incidence of disease. It can also reduce bruising during harvest.

Vines should be killed two to three weeks prior to harvest. This may be achieved by chemical application or by cutting, burning or pulling. Aesthetic issues can have a significant effect on marketability, especially in the fresh-market segment.

Bruising is generally caused by four primary factors:

- Soil condition – proper soil water content should be between 60% (loam) and 80% (sand) of field capacity. Pivots can also help assure sufficient soil moisture for a more efficient harvest. Easy to apply some water to ‘wet up’ the soil for easier harvest.

- Tuber condition – the condition of tubers is affected by fertility level, pest control, tuber maturity and vinekill timing.

- Tuber temperature – at harvest, tuber pulp temperature should be between 10° and 15° C (50° and 60° F). Optimum conditions are when the tuber temperature equals soil temperature.

- Harvester operation – machine adjustments should be made to minimize bruising, as per manufacturer recommendations. In general, worn/damaged parts on the harvester should be replaced before harvest. A well-trained, conscientious operator is an important factor in harvesting a crop with minimal bruising. Operating speed and adjustment of the machine are critical factors in reducing bruised tubers.

Storage

Potatoes are commonly stored on-farm for some period following harvest, so storage considerations are an important part of the overall management plan. Proper equipment and management are needed to maintain quality. Proper unloading at the storage facility is important to minimize bruising.

It is important to properly manage potatoes in storage to maintain quality and prevent disease occurrence. Depending on final use of the tubers, storage temperatures vary from 4.5° to 13° C (40° to 55° F). Ventilation and humidity control are critical factors in storing potatoes. Potatoes stored for more than 60-130 days may need application of a sprout inhibitor to prevent cell division.

Pivot and Linear/Lateral Irrigation

Center pivots and linears are the most effective type of irrigation for a variety of crops, climates and terrains – a blend of efficiency, uniformity, durability and convenience that other methods can't match.

Water Efficiency

Only about 50% of water is absorbed using flood irrigation; with center pivot and linear irrigation, application efficiency rates improve to up to 97% – similar to drip irrigation. Plus, pivot irrigation is highly uniform, unlike flood, or drip which applies water unevenly across the field.

Cost Efficiency

Center pivots require significantly lower initial investment when compared to drip irrigation – saving more than $830 (USD) per acre ($399 per hectare). And when you consider that half of the water used applied with flood irrigation is not absorbed by the crop, that can mean thousands of dollars wasted every season. Plus, fungicides can be applied much more effectively through pivots than through drip systems.

Drip systems may not last as long (depending on the quality of maintenance) and cannot be resold. Pivot systems maintain significant resale value even after many years of service.Besides these advantages pivots can apply fungicides too.

Labor Efficiency

Both flood irrigation and drip irrigation remain mostly manual processes, with limited remote technology. Flood requires moving pipe and opening or closing floodgates. Of course, pivots require periodic maintenance, but drip requires daily and weekly maintenance such as flushing filters, checking valves and chlorinating – plus algae and pest damage are expensive problems.

With connected crop management solutions, one person can monitor and control multiple pivots covering thousands of acres, saving thousands of dollars each year in a volatile labor market.

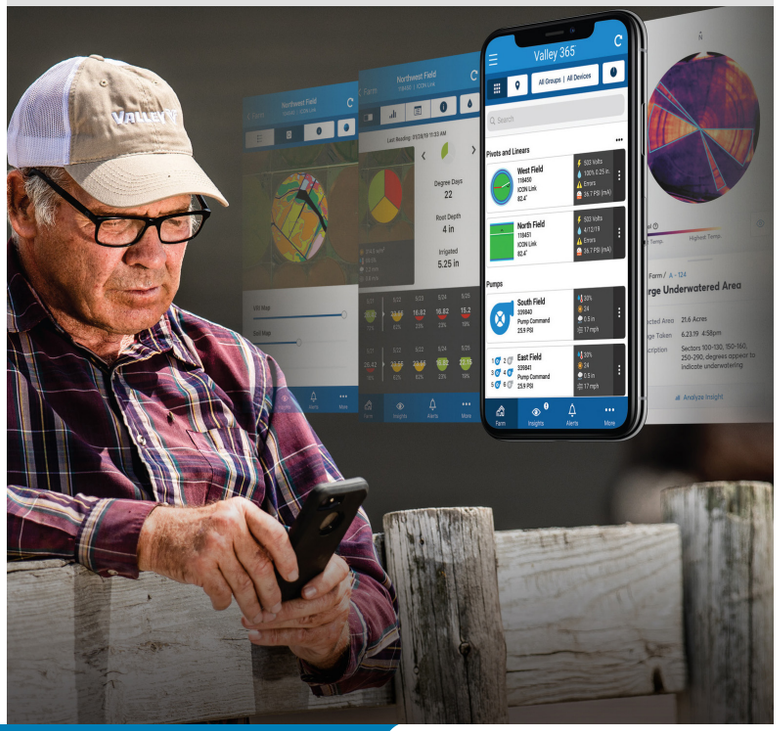
Growing Potatoes with the Irrigation Leader

Valley is the Global Irrigation Leader

Reliability and Overall Value

You don't want the cheapest for your operation, you want the structures and technology that will maximize your return on investment. Since 1954, Valley has been providing the greatest value in the irrigation industry. That's why generations of growers continue to trust Valley pivots, linears and corner machines.

- Engineered with strength to avoid costly repairs and meet the needs of today's growers
- Best long-term life on any terrain
- Significant resale premium over other brands



Advanced Precision Technology

Our precision irrigation solutions take your operation to the next level and make you more profitable.

Forecast & Plan

Growers can Forecast & Plan water delivery better with Valley Scheduling technology™. View data on soil moisture, crop type, stage of development and automatically updated weather information. Then get easy-to-understand irrigation recommendations based on real field data.

Monitor & Control

Once growers make irrigation decisions, they need to be sure those decisions are implemented correctly. The tried-and-true power of AgSense® technology gives growers greater control in real time so they can manage everything from pumps to pivots and more.

Optimize & Apply

Every field is different. Even within fields, there are variations in soil type and topography. With Valley Variable Rate Irrigation (VRI), growers can Optimize & Apply their water in the most accurate way possible, based on field-specific irrigation prescriptions.

Access to Valley Insights®*

Growers still like to walk the fields, but not every potential issue is visible soon enough or with the naked eye. Using various types of imagery and artificial intelligence algorithms, Valley Insights, powered by Prospera, virtually scouts fields for crop health concerns.

* Currently available in select regions

Responsive Service

Our industry-leading dealer network supports you after the sale, and whenever you need help most. Unbeatable, factory-trained service comes standard when you buy a Valley. This responsiveness is particularly important raising potatoes, when a few days of down time can significantly impact crop yield and quality.

- Extensive inventory of Valley Genuine Parts and other brands; this may be particularly important raising potatoes where a few days of down time can significantly impact crop yield and quality.

- Factory-trained personnel to help you solve problems and take advantage of opportunities

Growing Potatoes with the Irrigation Leader

The Pioneer in Ag Sustainability

At Valley, we were helping growers achieve sustainability from our beginning in 1954. As the population increases and farmable land disappears, every innovation we introduce helps produce greater economic yields while protecting the environment resources. Our solutions are engineered to be efficient, conserving water and energy, and transforming the way food and fiber are grown.

Our technology, advocacy and leading dealer network assure that growers around the globe have access to innovations that can transform local communities. From the recyclable steel in our machines, to our cloud-based connected crop management, to innovations that harness the sun's power and apply water and protectant precisely, Valley is the leader in sustainable irrigation.

Conclusion

Like many agricultural crops, potatoes can be a profitable enterprise. However, due to the high costs associated with this crop, the risk is greater compared to crops like corn, wheat or soybeans. This crop has been successfully adapted to a range of geographies and climates. The ability to remain profitable over the long term requires management attention to a wide range of factors.

This high-risk, high-reward crop is certainly attractive, but good management is imperative for long-term success.

Contact your local Valley Dealer to learn more about how our solutions can help maximize your potato yields and profitability.

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