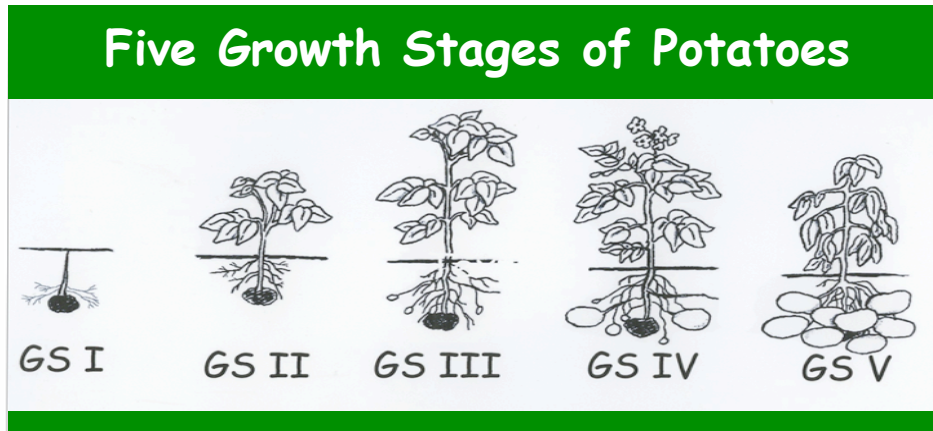


## **Western Laboratories' New and Improved Secret Vault Program - 2007**

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Potato plants have differing nutrient requirements at different growth stages.



### ***Growth Stage 1***

The nutrient requirement is 100% dependent from the seed piece.

### ***Growth Stage 2***

The nutrient requirement is still 25% dependent from the seed piece. The remaining nutrient requirement is quite small until row closure.

### ***Growth Stage 3***

This stage takes 7 to 10 days. Carbohydrate partitioning occurs during this stage and all nutrient requirements come from the soil. Carbohydrate partitioning means surplus energy from the leaf is now being transported to the tuber. Up until this point from emergence to flowering, the crop needs one pound or less of nitrogen and potassium per acre per day. All other nutrients required in thimblefuls per day.

### ***Growth Stage 4***

This stage is tuber bulking. This is when the crop can require 2 to 3 pounds of nitrogen per day, 3 to 14 pounds of potassium per day, etc. We have spent over 25 years developing a Supply Rate test of the soil to meet the demand rate of the crop. While the root takes in nutrients, an area around the root is created called the "zone of depletion". Look at the first 2 weeks on the Secret Vault report. What the test indicates is the nutrient requirements to meet the zone of depletion. The soil supply rate number will show a deficiency before the plant test will. Look at the potassium levels for the plant and soil on the report. The plant is adequate, but the supply rate is deficient. The farmer did apply potassium preplant on course, sandy soil. Either preplant precipitation or irrigation has washed enough potassium below the root zone that it is not meeting the supply rate demands. All nutrient levels in potato plants decrease with age except for calcium and magnesium. They increase with age.

In this example if you waited for the petiole test to drop below 7.5% two things will happen; 1) instead of bulking at 10 sacks per day, you could bulk at 3 sacks or less per day because the demand rate is not being met by the supply rate, and 2) verticillium wilt will establish itself 6 weeks earlier than it should.

Bulking is like a female dog with 15 pups. The pups get all their nutrition from their mother (the potato plant). If the supply rate by the mother isn't met by the demand the pups (tubers) will lose their vigor. The biggest demand for the dog was after the pups started growing (bulking), not before. Too many farmers place their fertilizer program before Growth Stage 4 (bulking). Eighty percent of the nutrient requirement of potatoes occurs in Growth Stage 4. If you want to be an average grower, stay with your current program.

For the last two years our soil sufficiency rate was reported as tuber bulking units, which was milligrams per 100 grams. No one understood this. I did this to confuse the competition, thinking they knew as much about the rhizosphere as I did. It was a mistake. The numbers are now in pounds and ounces.

You will see recommendations even though the plant levels are sufficient. This is because the soil levels are below the sufficiency range bulking demand rate on the report. We now make a recommendation based on the soil and plant rate relationship.

### ***Growth Stage 5***

In this stage all the energy from the plant is transported to the tuber. If your crop or seed crop doesn't go through Growth Stage 5, the potatoes will have low nutrient vigor, thin skin and physiological young potatoes with low solids and higher sugars. There are 125 sacks to be transported to the tuber in Growth Stage 5.

In potatoes each nutrient has primary and secondary functions:

- Nitrogen and sulfur are for growth and amino acids.
- Nitrogen, magnesium and iron are involved in converting carbon dioxide to a three-chain carbon molecule.
- Copper and manganese converts that three-chain molecule into a six-carbon chain sugar.
- Potassium attracts water, giving the plant turgidity.
- Potassium and copper work together to prevent disease.
- Potassium and boron transport the sugar from the leaf to the tuber.
- Zinc is the primary growth regulator.
- Phosphorus and calcium work in cell division and cell elongation (bulking).
- Phosphorus is the root growth and maturation element.
- Calcium is the antacid of the cell and binds cells together.
- Potassium, magnesium and calcium give you good skin set.
- Over and under irrigation gives you farm auctions.

John P. Taberna