

NITROGEN MANAGEMENT

in Louisiana Sweet Potatoes

Introduction

Sustainable and profitable commercial sweet potato production requires proper management of nitrogen fertilizer. Inadequate or excessive amounts of nitrogen fertilizer can be detrimental to a sweet-potato crop and can negatively affect yield potential. In addition, excessive or improperly timed nitrogen fertilizer can result in added expense, leaching and contamination of surface and ground water. Informed decisions that consider crop history and soil type are important factors to consider in determining the proper amount of nitrogen fertilizer that should be applied in a sweet-potato production field.

Nitrogen Management and Soil Moisture at Planting

Recent research suggests that available soil moisture is one of the most important variables to consider at planting. Soil moisture (*excessive/inadequate/optimal*) appears to be the most limiting factor in determining storage root-number during the critical early developmental stages (one to 30 days after transplanting) in sweet potatoes. Nitrogen management and management of other nutrients should be considered along with other production variables, such as soil moisture, plant spacing, planting dates and varieties to maximize early development of the crop.

Nitrogen Application Timing

Preplant applications: The entire amount of nitrogen fertilizer is applied prior to transplanting.

Delayed applications: The entire amount of nitrogen fertilizer is applied three to four weeks after transplanting.

Split applications: A portion of the nitrogen fertilizer is applied prior to transplanting with the remainder applied three to four weeks following transplanting.



Plants grown in culture solution with complete nutrients showed normal growth and uniform green color.



Plants grown in culture solution without nitrogen showed poor growth and yellowing in older leaves.

What Amount of Nitrogen Fertilizer Does My Sweet Potato Crop Need?

In general, sweet potatoes produced in Louisiana do not require high amounts of nitrogen fertilizer. Sweet potatoes produced on most soil types require 35-40 lb of nitrogen per acre. Previous cropping systems, soil pH, variety and soil texture all can influence nitrogen requirements and rate of application.

When Should Nitrogen Be Applied?

Nitrogen requirements for sweet potatoes can vary among cultivars, geographic locations, climates and cropping seasons. This information suggests that the ***nitrogen management decision should be specific for a specific variety produced in a given production region.*** Nitrogen management research conducted on the Beauregard variety in Louisiana, suggests that maximum yields are achieved when nitrogen fertilizer applications are either delayed or split with the majority of the nitrogen applied three to four weeks following transplant.

The positive yield responses associated with delayed and split applications is, in part, attributed to the fact that high levels of nitrogen are not required for optimal storage root initiation, a process that occurs as early as 13 days after transplanting. In addition, maximum nitrogen uptake by sweet-potato storage roots is greatest between 23 and 40 days following transplanting, which suggests that delayed or split applications will potentially increase the amount of nitrogen used by the sweet-potato crop.

Common Nitrogen Sources

Source	Analysis
Ammonium Nitrate	34-0-0
Calcium Nitrate	15.5-0-0
Potassium Nitrate	14.5-0-45
Urea	46-0-0
UAN 32 (liquid)	32-0-0
Mono Ammonium Phosphate	11-48-0
Diammonium Phosphate	16-48-0 or 18-46-0
Ammonium Phosphate (liquid)	10-34-0 or 11-37-0

How to Determine Which Source to Use

Cost and availability often dictate what form of nitrogen is used today. Many producers are using Mono Ammonium phosphate (MAP) or Diammonium Phosphate (DAP) as a source of phosphorous. Both of these products contain nitrogen, and, thus, a percentage of the nitrogen requirement for a particular field is satisfied with preplant applications of



MAP or DAP. Ammonium nitrate and urea are the most common nitrogen sources used in commercial sweet-potato production in Louisiana. Ammonium nitrate is subject to leaching but is not as volatile as urea. Urea is usually less expensive than ammonium nitrate but should not be surface-applied because of potential losses from volatilization if not incorporated or when soil conditions are excessively wet. Liquid formulations of nitrogen also are available and, similar to granular fertilizers, can be blended with other nutrients to achieve a desired fertilizer analysis.

Foliar-applied Nitrogen: Several formulations of foliar nitrogen amendments also are available. Foliar applications often are used when soil amendments cannot be applied or incorporated in a timely manner, related to development of the crop. The application window for foliar nitrogen is similar to that of sidedress applications. Producers should follow label recommendations on the various foliar nitrogen fertilizer products that are available.

How Should a Sweet Potato Crop Look 30 Days After Transplanting?

Under optimal growing conditions, sweet-potato plants will typically have 21-42 new leaves and three to four branches 30 days after transplanting. Sampling of the root system during this same time interval will typically show three to seven thickened storage roots. If plants appear to lag behind these developmental stages, tissue sampling can be performed to determine nutrient status and subsequently make informed management decisions.

Recognizing Nitrogen Deficiency

Nitrogen deficiency is not very common in Louisiana sweet-potato production, and symptoms will vary depending on crop stage and maturity. Fields deficient in nitrogen may have a marked reduction in vine growth and a delay in overall crop development. In general, sweet potatoes deficient in nitrogen will have a light green appearance and chlorosis or (yellowing) of the leaves. If nitrogen is not limiting

initially, plants may express few visual deficiency symptoms but will have an overall yellow appearance and may experience some shedding of older leaves. If nitrogen deficiency is present throughout crop development, plants will have a uniform pale color and reduced vine growth. Diagnostic tests of plant tissues should be conducted to evaluate nitrogen levels in the plant if a deficiency is suspected. The leaf-N content sufficiency range for Beauregard and Evangeline varieties is 3.3-4.5 percent when sampled between 35-50 days after transplanting.



Plants grown in pots with excessively high nitrogen rate (left) showed reduced root development compared to plants grown with the recommended amount of nitrogen.

Nitrogen Fertilizer Management in Sweet Potato Plant Beds

Bedding-seed roots represent the initial phase of sweet-potato production. Despite its importance, very little information is available concerning the proper amount of nitrogen that should be used in plant beds to maximize crop performance in the field. Nitrogen that is applied in plant beds is taken up by the transplants prior to cutting and used by the plants once they are planted into a commercial production field. It has also been noted that more bed-applied nitrogen is used by the plant when field-applied nitrogen is applied as a split or sidedress application after planting. Therefore, use of bed-applied nitrogen and then splitting or sidedressing the field-applied nitrogen applications provides for the most efficient use of this nutrient in sweet potato. Rate and analyses of plant-bed fertilizer should be considered along with proper seed placement (*not piling, but spreading seed out to promote stronger*



Informed production decisions and proper nutrient management enhance productivity and vigor of a sweet potato crop.

transplants), proper aeration and management of the plastic mulch. A general recommendation for sweet-potato plant-bed fertilization is to apply 300-500 lb of a 1-3-3 ratio of a complete fertilizer, such as 8-24-24 or 7-21-21.

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