Sweet potato: A Soil Conserving Root Tuber Crop

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Definition: Sweet Potato (*Ipomoea batatas*,) a native of Central and South America, belongs to the *Convolvulaceae* (morning glory) family. It is a drought resistant, herbaceous, perennial trailing vine and considered one of the first vegetables known to mankind. Even though Columbus is known for finding this Native American root plant in West Indies, the Spanish explorers of the 16th century are credited with the repute of introducing sweet potato tubers to the US colonists. Rapidly, it developed into a major food item of the southern traditional kitchen and also, is popularly used as a livestock. Mississippi upholds third place in sweet potato production in the US. This tender, tuberous, underground vegetable is considered the seventh prominent food crop in the world.

Purposes:

- To conserve soil and water through the use of vegetation
- To maintain and /or improve soil availability, quality, and soil nutrients
- To suppress weeds, reduce insect pests and diseases, and increase crop yield
- To improve soil tilth, soil organic matter, and soil structure

Planting: The popular types of sweetpotatoes, commonly grown in America are Jewel, Oriental or Japanese and Hanna. Preformed ridges (6 to 9 inches high) in a full-sun area are necessary for planting slips (rooted cuttings) from mid-May to late June. Keep soil temperature above 65F/50 at night and below 90 during day.) Being a warm season crop, cultivars mainly are sensitive to frost and waterlogging. Planting to harvest will take 120 to 150 days (4 to 5 months.) Moderate irrigation for a week after transplanting will ensure plant establishment and root development. Stop watering a month before harvest for maintaining root protection and higher yields. From

late August to early November, harvesting is possible when the leaves turn yellow. Utmost care should be given to the roots not to get bruises, during the harvest.

Soil and Spacing: Sweet potatoes prefer a fertile, well-drained, loose, deep, slightly acidic, fine sandy loam or very sandy soil. A soil pH of 5.5-6.5 is perfect for better growth. Develop problem soils by adding compost/well-rotted manure and organic matter, prior to planting. Evenly spreading phosphorus, potassium and nitrogen, based on a soil test, will encourage the formation of large tubers. Set the plants 12 – 18 inches apart in the row, at a depth of 4 inches. Leaving 3 to 4 feet between rows will allow good aeration and ample space for the vines to spread.

Crop Rotation is one of the earliest, valuable and practicable cultural management method for eliminating plant diseases and pests. Additionally, a good rotation maintains soil fertility, reduces soil erosion and depletion, and controls wind and water erosion. A planned rotation scheme skillfully suppresses insect and disease outbreaks, decreases pesticide applications, and offers better production and bigger harvest to the grower. Taking into account the alleopathic nature of sweetpotatoes, the rotation pattern should be cautiously selected. Rotating with other crops on a 3 or 4 year cycle is the standard procedure to prevent pest attack and disease organisms. The beneficial preceding and succeeding crops for sweet potato are corn and squash.

Mulching is a traditional practice done in farming globally that is vital for soil and plant protection. Mulches are capable of changing the environment around the plants and control weeds and annual grasses, soil erosion and runoff and soil-borne diseases. Besides, they decrease moisture evaporation, increase water absorption and retention and boost root growth. Organic or natural mulches such as compost provide many favorable and fertilizer like effects for sweet potato production by supplying abundant plant nutrients, during their decaying process. Applying mulch early to warm-season crop such as sweet potato extensively limits frequent watering and regulates soil temperature.

Disking is an age old method in farming that prepares early seed bed and lessens biennial and perennial weeds and diseases. Also, this process helps mix plant residues into the soil and accelerates decomposition. Other benefits include breaking up clods and compacted soil, and spreading granules neatly over the cultivating area. A month after planting, sweetpotatoes have to be hilled using a disk-hiller. The procedure of hilling aids in root growth and eliminates the weeds. Shortcomings of disking include soil and crop residue loss, chances of soil erosion, dust and labor expenses. Disking wet soils leads to soil compaction, lower yields and limited root expansion.

Weed and Pest Control: Rotations, shallow cultivation, mulching, field selection, good sanitation, cultural practices, and usage of certified and quality slips, and moderate applications of herbicides are crucial for eliminating weeds. Most popular method of direct weed control in sweetpotato is through cultivation. Sweet potato weevils, black-rot, stem-rot, root-knot nematodes, flea beetles, wireworms and cutworm attacks can be prevented considerably by destroying crop residues after harvest. Fall tillage, regular farm scouting and removing affected foliage, light watering or drip irrigation and maintaining cleanliness around the field are good

alternatives. In order to avoid soil-borne diseases and pest attack, sweet potato should not be planted in the same location in successive rotations.

Cover Crops are grown for their exceptional capabilities to safeguard and improve soil quality. Residues of cover crop offer nutrients and soil fertility to the succeeding crop. Raising cover crops like winter rye, clover and buckwheat before planting sweet potatoes will support farm sustainability. They enrich the soil by minimizing soil erosion, conserving soil moisture, maintaining organic-matter content and building beneficial arthropods, suppressing weed growth and ensuring better yields. At the same time, careful preparation, suitable variety selection and careful management are needed for receiving positive results from the cover crops.

Residue Management: Crop residue help reduce erosion and improve run-off water from farmlands. Surface residue management is widely practiced to control erosion, today. Crop residue returned to the soil maintains soil quality and productivity. It replaces plant nutrients and reduces fertilizer requirements. Sweet potato residue incorporated into the soil decays faster than the residue left on soil surface. The rate of residue decomposition is an important factor in erosion prediction and nutrient management. This decomposition rate depends on the carbon and nitrogen content of the residue. Burial of crop residue decreases pathogen survival and physically removes their access to the new crop.

Sweet potato is a soil conserving crop. The total fresh residue mass of sweet potato (root and shoot) ranges from 69,000 lbs to 75,000 lbs/acre (9,800 to 10,600 lbs. /acre of dry residue.) The dry residue of sweet potato contains 40.2% carbon and 2.02% nitrogen. At this rate, this crop returns 3,940 to 4,260 lbs of carbon and 198 to 215 lbs. of nitrogen, per acre. After clipping and tilling, sweet potato gives an average residue cover of 55%. The canopy cover reaches 100% after 90 days and goes down to 60% after 120 days of planting. Leaf area index (LAI) is the unit area of leaves per unit area of soil surface. LAI goes up to 5.5 after 90 days and it falls below 3 after 120 days of planting. The maximum root depth, stem diameter, and canopy height recorded are 25, 0.9, and 18 inches, respectively. The yield of sweet potato ranges from 29,000 lbs to 32,000 lbs/acre.

Published by Alcorn State University Extension Program, School of Agriculture, Research, Extension, and Applied Sciences, Alcorn State University, Mississippi, in collaboration with the USDA/NRCS. Alcorn State University is deeply grateful to the USDA/NRCS for providing funds for this publication. *Corresponding author