Watermelon as a Soil Conserving Crop

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Definition: Watermelon (Citrullus lanatus) belongs to the Cucurbitaceae or guard family and is a native of the Kalahari Desert in southern Africa. It was found cultivated long ago in Mediterranean regions, China and India. These days, this ancient, herbaceous, tender, trailing, warm-season, annual vegetable is cultivated across the world for its sweet, juicy fruit. Watermelon was introduced to North America by the Africans and the European colonists. The southern warmer climate of the US suits this crop splendidly and they are raised in 44 states, making the nation the fourth in global production, today.

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: Watermelon cultivars in the US include open pollinated, diploid hybrid, and triploid (seedless) varieties. This frost sensitive crop requires a sunny site. Direct seeding (Mid-April to Mid-May) is considered best but fruits grown from transplants offer earlier harvest. Organically improved, fertilized and early prepared seed bed will maintain moisture as well as firmness for vigorous plant growth. Temperatures between 68 and 95 F are necessary for seed germination. For the establishment of a one acre farm, 1 to 2 lbs of seeds are generally required. For maturity, watermelons require minimum 3 to 4 months (90-150 days) depending on good management, soil temperature and variety. As heavy feeders and plants with broad root systems, constant moisture irrigation (drip or overhead) is vital for watermelons during the initial stages of
flowering and also at the time of fruit formation. Availability of bees around the farm will ensure consistent production. Hand harvesting melons (July- August) before the vines turn withered and catch stem-end rot is important.

**Soil and Spacing:** Watermelon prefers sandy loam, well-drained, moist and loose soil and is tolerant to slight acidity. A pH of 6.0 to 6.8 is ideal for significant growth. Advanced organic soil mulching, fertilization (with controlled liquid and seaweed sprays,) good drainage, raised rows (with floating row covers) and warm temperature will offer better results even in clay soils. Lime application to a low pH soil results in improved yield. Watermelon grows best in soils composted with straw, leaves, wood shaving and cow manure. Until the harvest, potassium and phosphorous fertilizers should be added. Mixing the soil with poultry litter produces the effect of ammonium nitrate fertilizer. This crop demands plenty of room and so rows should be spaced 6 to 10 feet apart, and seeds sowed at a depth of one inch.

**Crop Rotation** is the brilliant cultural strategy of controlling diseases and pests in vegetable production. This effective scheme directs the farmer to grow diverse crops on the same field, in a customary returning sequence, with long term success. Also, rotation increases soil fertility, soil condition and moisture management and biologically stops the cycle of pests and diseases. Further, rotation significantly improves crop quality by contributing various nutrient supplements to it, every season. Raising organic watermelons in rotation with legumes has benefit of largely developing the soil and water quality. Cotton, forage soybeans, red clover, grass crops, alfalfa, peas and beans are some favorable preceding crops that are capable of producing productive soil for watermelon growth. Additionally, they help the farmer avoid fertilizers and herbicides, in every respect. Hairy vetch and crimson clover are considered positive succeeding crops.

**Mulching** is a natural method of spreading protective materials over the soil or around the base of plants to safeguard soil and plant life. Thick mulch suppresses weeds by blocking light and controls soil erosion and soil crusting. Acting as a soil cover, mulches enrich soil quality, and conserve soil moisture but make certain to apply them only when the soil turns warmer. Organic mulches like straw, wood chips etc shelter earthworms and add nutrients, ventilate the soil as they decompose and conserve soil moisture. Living mulches allow water-holding capacity and maintain soil temperature. Frequent mulching reduces soil-borne diseases dramatically, prevents watermelon from touching the soil and helps produce quality melons and higher yield. Also, black plastic/polyethylene mulching is effective in preventing weeds and maintaining the soil humidity and warmth.

**Disking** is a traditional practice in farming that helps destroy weed pressure, soil compaction and provides a uniform as well as improved seedbed for planting. Further, this age-old process
furnishes loose soil that promotes better seed/soil contact. Disking turns under waste from earlier crops, exterior products, manures etc. and guarantees their decay and assimilation. Usually, disking operations conducted earlier to planting watermelons ensure deeper rooting and enhance better production and harvest. Avoid disking fields after plowing because this action will lead to soil compaction. Drawbacks of disking include soil erosion on sloppy land, reduced water dispersion, dust, labor/machine costs and general decline in upcoming productivity.

**Weed and Pest Control:** Prevention, avoidance, monitoring, and suppression are pest management strategies. Mulching, crop-rotation, hand weeding, flooding, cover cropping, cultivation, hoeing, fumigation, usage of stale-seed-bed and herbicides are effective methods for weed control. Aphids, cucumber beetle, seed corn maggot, mites etc are problematic insects that cause crop loss. Cool temperature, white fly migration and aphids can be suppressed naturally by timely disking, using floating row covers, garlic spray, insecticidal soap, hot pepper wax, lady bugs, horticultural oil, traps and weekly monitoring. Copper and sulfur are effective mineral fungicides for eliminating diseases in organic watermelon Resistant varieties are recommended for a bumper harvest.

**Cover crops and Green manure** are vital for successful farming. They include legumes, grasses or small grains planted amid phases of expected crop production, for the advantage of the soil and the main crop. Cover crops largely control wind and water erosion, add organic matter, reduce weed buildup and enrich soil fertility. Raising winter cover crops like crimson clover and hairy vetch in the fall profitably promotes the production of watermelon. Small grain cover crops suppress insect migration and are excellent windbreaks. Hairy vetch strongly keeps away root-knot nematode. Green manure cover crops are turned under to enhance soil structure, nutrients, drought resistance and biological activity. Wheat, ryegrass and oats are suitable winter cover crops for watermelon and can be turned under as green manure, later. Some cover crops destroy weeds with its alleopathic reaction. Thriving cover crops should be plowed under before they start to bloom.

**Residue Management:** Crop residue management is a valuable technology for reducing erosion and improving run-off water quality from agricultural lands. Surface residue management is widely practiced to control erosion today. The rate of residue decomposition is elemental from both agricultural and environmental standpoints. The decomposition rate depends on the carbon and nitrogen content of the residue. Residue cover can protect the soil against raindrop impact, improve soil aggregation and enhance structural attributes, increase infiltration capacity, fix plant nutrients, and suppress weed growth. The amount of crop residue produced and subsequently available for erosion control depends on the type and yield of the crop grown and the tillage system used. Incorporating cabbage residue into mulched soil can expand growth and yield of
watermelon. Application of hairy vetch residue into the soil notably controls the long thriving fusarium fungus with its toxic ammonia production.

The total residue mass of watermelon (root and shoot) ranges from 12,385 lbs to 17,000 lbs/acre (1,710 to 1,770 lbs/acre of dry residue). The dry residue of watermelon contains 39.63% carbon and 2.83% nitrogen. At this rate, this crop returns 677 to 701 lbs of carbon and 48 to 50 lbs of nitrogen per acre. Watermelon will give an average residue cover of 48% after clipping and tilling. Similar to the residues of most cucurbits, watermelon residue decomposes faster immediately after the harvest due to its low carbon to nitrogen ratio. The canopy cover goes beyond 85% after 70 days and goes down to 75% after 90 days of planting. Leaf area index (LAI) is the unit area of leaves per unit area of soil surface. LAI goes up to 1.22 after 70 days of planting. The maximum root depth, stem diameter, and canopy height recorded are 10, 0.73, and 11.8 inches respectively. The yield of watermelon ranges from 90,000 to 100,000 lbs per acre.