**CROP ANALYSIS**

**Cocoa**

Climate Conditions

The natural habitat of the cocoa tree is in the lower storey of the evergreen rainforest, and climatic factors, particularly temperature and rainfall, are important in encouraging optimum growth.

* Temperature

Cocoa plants respond well to relatively high temperatures, with a maximum annual average of 30 - 32ºC and a minimum average of 18 - 21ºC.

* Rainfall

Variations in the yield of cocoa trees from year to year are affected more by rainfall than by any other climatic factor. Trees are very sensitive to a soil water deficiency. Rainfall should be plentiful and well distributed through the year. An annual rainfall level of between 1,500mm and 2,000mm is generally preferred. Dry spells, where rainfall is less than 100mm per month, should not exceed three months.

* Humidity

A hot and humid atmosphere is essential for the optimum development of cocoa trees. In cocoa producing countries, relative humidity is generally high: often as much as 100% during the day, falling to 70-80% during the night.

* Shade and light

The cocoa tree will make optimum use of any light available and traditionally has been grown under shade. Its natural environment is the Amazonian forest which provides natural shade trees. Shading is indispensable in a cocoa tree's early years.

**Soil condition**

* Physical property

Cocoa needs a soil containing coarse particles and with a reasonable quantity of nutrients, to a depth of 1.5m to allow the development of a good root system. Below that level it is desirable not to have impermeable material, so that excess water can drain away. Cocoa will withstand waterlogging for short periods, but excess water should not linger. The cocoa tree is sensitive to a lack of water, so the soil must have both water retention properties and good drainage.

* Chemical property

The chemical properties of the topsoil are most important, as the plant has a large number of roots for absorbing nutrients. Cocoa can grow in soils with a pH in the range of 5.0-7.5. It can therefore cope with both acid and alkaline soil, but excessive acidity (pH 4.0 and below) or alkalinity (pH 8.0 and above) must be avoided. Cocoa is tolerant of acid soils, provided the nutrient content is high enough. The soil should also have a high content of organic matter: 3.5% in the top 15 centimetres of soil. Soils for cocoa must have certain anionic and cationic balances. Exchangeable bases in the soil should amount to at least 35% of the total cation exchange capacity (CEC), otherwise nutritional problems are likely. The optimum total nitrogen / total phosphorus ratio should be around 1.5.

State in Nigeria that is suitable for cocoa plantation

Ondo, Cross River, Ogun, Akwa Ibom, Edo, Ekiti, Delta, Osun and Oyo.

Agro-ecological situation

**PALM OIL**

**CLIMATE**

Conditions: Humid tropics (such as in Malaysia, Indonesia and Thailand) or Semi-arid tropics (such as in India)

Solar radiation: 16 MJ/m2

Rainfall: 1000 to 2500 mm/annum

Relative humidity: 40 to 85%

Mean ambient temperature: 28 ºC

Mean wind speed: 0 to 10 m/sec

**SOIL**

Soil suitability: Deep, well drained, fertile fine sandy to clay loams

Optimum soil pH: 4 to 6

Organic carbon: 1.2 to 1.5

Soil bulk density: 1.0 to 1.4

Groundwater table: Below 1.5 to 2.0 m.

Soil to avoid: Waterlogged, alkaline and saline soils

**PLANTING TIME**

Rainy or winter season or year-round under assured irrigation water supply.

**WEED CONTROL**

Circle and path weeding every two months; selective weeding and creeper and vine removal every six months.

**RECOMMENDED HERBICIDES:**

Paraquat (2.2 kg a.i./ha)

MSMA (2.0 – 2.5 L/ha)

Oxyfluorfen (2.0 L/ha)

Glyphosate (2.0 – 2.5 L/ha)

Fluazifop-butyl (1.0 – 1.5 L/ha)

Oxadiargil (0.5 L/ha)

**PEST**

Important pests of oil palm include bag worm, nettle caterpillar, rhinoceros beetle, cockchafer, palm kernel borer and rats.

**DISEASES**

Important diseases of oil palm include crown disease, wither tip, spear rot, marasmius bunch rot, upper stem rot, basal stem rot, vascular wilt, cercospora elaeidis, red ring nematode, etc.

**RUBBER**

Rubber trees (Ficus elastica) are easy to grow and thrive in a variety of conditions.

**LIGHT**

Rubber trees thrive in outdoor locations where they receive full sun, but they will adapt to low light or partial shade conditions. Indoors, rubber trees do best in bright light, such as an east-facing window where they receive bright morning sunlight. Rubber trees that receive too little light both indoors and outdoors may drop their leaves.

**TEMPERATURE**

Rubber trees are native to the warm climates. They thrive in warm to average temperatures indoors, while outdoors, they do best when temperatures range between 60 to 65 degrees Fahrenheit at night and 75 to 80 degrees during the day. When growing indoors, keep your tree away from cold drafts, which can cause the leaves to drop.

**SOIL**

When planting a rubber tree in containers, a well-drained houseplant mix, such as a mixture of three parts loam soil, one part peat and one part coarse sand is ideal. Outdoors, rubber trees can grow in a wide range of soils, including clay, sand and loam. They can tolerate both acidic and alkaline soils, but need good drainage.

**WATER**

Rubber trees like consistent moisture, but too much water can lead to problems such as root rot. Rubber trees should be watered thoroughly but allow the soil to dry somewhat between watering. If the soil is consistently wet, the leaves of your rubber tree may yellow. This plant has a high drought tolerance, so when in doubt as to whether your rubber tree needs water, it’s best to wait instead of risking giving it too much water.

**FERTILIZER**

Your rubber plants fertilization needs will vary depending on the time of year. Fertilize your plant monthly with a water-soluble houseplant fertilizer during the growing season. Reduce the frequency of fertilization in the fall to every other month, and do not fertilize at all in the winter months.

**PESTS AND DISEASE**

While rubber trees have no serious pests, they are vulnerable to scale insects, aphids, spider mites and mealy bugs. Keeping the leaves clean with regular rinsing can prevent most insect problems from becoming severe. Insecticides containing malathion can effectively control heavy infestations.

**SORGHUM**

**CLIMATE**

Low temperature, not length of growing season, is the limiting factor for production in most of the Upper Midwest. Average temperatures of at least 80°F during July are needed for maximum grain sorghum yields, and day-time temperatures of at least 90°F are needed for maximum photosynthesis. For example, normal average temperatures for July are about 75°F in southern Wisconsin. Night temperatures below 55°F for a week at the heading and pollination stage may result in heads with very little grain. Normal night temperatures during August range from about 65°F in southern to 60°F in central Wisconsin. In September, the range is from 55°F in southern to 50°F in central Wisconsin. In southern and central Minnesota, July and August temperatures are similar to those for southern Wisconsin. Therefore, low temperatures may prevent successful production of grain sorghum in central and northern Wisconsin and Minnesota or as a late-planted emergency grain crop in southern Wisconsin and Minnesota. Plants should complete heading by early August to insure excellent grain set.

Soil temperature at planting time is critical for grain sorghum. Sorghum seed needs soil temperatures of 60-65°F for good emergence.

**SOIL:**

Sorghum is more tolerant of wet soils and flooding than most of the grain crops-an interesting phenomenon in relation to its drought tolerance. However, most of the poorly drained, wet soils in Wisconsin and Minnesota are too cold for grain sorghum.

FERTILITY AND LIME REQUIREMENTS:

Nutrient needs of sorghum closely resemble those of com in that sorghum uses relatively large amounts of nitrogen and moderate amounts of phosphorus and potassium. The grain in a 100-bushel per acre grain sorghum crop removes about 100 lbs. of nitrogen, 14 lbs. of phosphorous, and 14 lbs. of potassium.

A soil test is the most practical method of determining fertilizer needs. Apply phosphate and potash according to soil test recommendations where soil tests for P and K are low (L) or very low (VL). Use the nitrogen and maintenance phosphate and potash recommendations shown in Table 1. Lime soils to a pH of 6.0 to 6.5. Nitrogen can be applied in the spring as a preplant application, at planting, or as a side dressing at cultivation. Appropriate N credits should be taken for manure and previous legumes to reduce N fertilizer rates. A starter fertilizer may be beneficial.

WEED CONTROL:

Early spring seedbed preparation followed by one or two shallow cultivations, just before planting sorghum will kill several generations of weed seedlings and give sorghum a chance to get ahead of the weeds. Timely cultivations of sorghum planted in 20-inch or wider rows during the early growing stages are highly important. Sorghum planted in narrow rows can not be cultivated, but it is a highly competitive crop and can dominate many weeds. Several herbicides are available to compliment cultural and mechanical practices. Quackgrass can be controlled with I qt/A of Roundup applied when the weed is actively growing and has 3 to 4 leaves. Other perennial weeds such as Canada thistle, milkweed and hemp dogbane should be suppressed the year before sorghum is planted.

Several selective herbicides can be used in sorghum. Atrazine can be applied as a preplant incorporated, preemergence or postemergence herbicide. Application rates are similar to those used in com, as are the concerns of atrazine carryover. If crops other than com will be planted next year, do not use atrazine in sorghum. On the other hand, sorghum could be safely planted in fields with atrazine residues from previous years.

Dual and Lasso can be used as a preplant or preemergence treatment only when sorghum seed is treated with a safener. Your seed dealer may be able to obtain safener-treated seed for you. Dual and Lasso are excellent annual grass herbicides and could be used in combination with atrazine. If incorporated into the upper 2 inches of soil, they suppress yellow nutsedge.

Ramrod is chemically related to Lasso and Dual but can be used preemergence in sorghum without a chemical safener applied to the seed. It controls many annual grasses and can be mixed with atrazine to control a broader spectrum of weeds.

Buctril, Banvel and 2,4-D are labeled for use in grain sorghum for postemergence broadleaf weed control. Their use directions and rates are similar to those for corn.

DISEASES AND THEIR CONTROL:

A seed treatment such as Captan should be used to control seed rots and seedling blights. Leaf diseases can be problems in areas with high rainfall and humidity, but generally do not cause serious losses. Planting resistant hybrids, providing optimum growing conditions, rotating with other crops, removing infested debris, planting disease-free seed are all methods which can be used to minimize losses from disease.

INSECTS AND OTHER PREDATORS AND THEIR CONTROL:

Under Minnesota and Wisconsin conditions, the most serious pest problem for grain sorghum growers is likely to be bird damage. Planting larger fields in one block and locating, these away from urban areas or farm buildings may help reduce the problem.

Grain sorghum is resistant to corn rootworms, but may be attacked by corn earworms, aphids, and greenbugs.