ANALYSIS OF CROPS

CEREAL CROPS

Maize

The general requirement for maize cultivation is as follows:

1. Temperature:

Maize is grown in temperatures between 18°C and 27°C during the day and around 14°C during the night. But the most important factor is the 140 frost-free days. The crop is very susceptible to frost; therefore, its cultivation in temperate latitudes is limited.

2. Rainfall:

Maize is grown mostly in regions having annual rainfall between 60 cm to 110 cm. But it is also grown in areas having rainfall of about 40 cm.

3. Soils:

Maize grows in a wide range of soils, ranging from temperate podzols to the leached red soils of the tropics. But, the best suitable soil for maize is deep, rich soils of the sub-tropics, where there is abundant nitrogen.

4. Topography:

The plain regions are most suitable for maize cultivation, because this helps in use of machines. Although, maize is also cultivated on undulating lands as well as on lower slopes of the hills. Maize is also grown as a major crop of shifting cultivation.

5. Economic Conditions:

Unlike other crops maize can be cultivated with small capital. Uses of machines have reduced the labour requirements. Most of the maize grown is utilised within the country, although its limited international trade is also there.

**RICE**

Suitable factors required for the cultivation of rice are :

1. Temperature:

Rice is a tropical crop and grown where the average temperature during the growing season is between 20°C and 27°C. Abundant sunshine is essential during its four months of growth. The minimum temperature should not go below 15°C as germination cannot take place below that temperature.

2. Rainfall:

Paddy requires more water than any other crop. As a result, paddy cultivation is done only in those areas where minimum rainfall is 115 cm. Although the regions are having average annual rainfall between 175—300 cm are the most suitable. Paddy also needs flooded conditions with the depth of water varying over 25 mm at the time of transplanting to as much as 150 mm for 10 weeks of the growing period.

3. Soils:

Paddy is grown in wide range of soil, from the podzolic alluvium of China to the impermeable heavy clay of central Thailand. Fertile riverine alluvial soil is best for rice cultivation. Clayey loam soil in monsoon land is considered to be the best for rice cultivation as water retention capacity of this soil is very high. Rice is also grown in saline areas of deltic region. Rice cultivation needs high fertilizer appli­cation.

4. Surface:

Unlike other crops, paddy needs a level surface to enable the fields to be flooded at least during the growing period. It’s ideal habitat is therefore in the great alluvial deltas and river basins of the world: the Ganges, Siking, Yangtzekiang, Irrawaddy, Menam Chao Phraya and Mekong, where there is practically no gradient.

5. Fertilizers:

Paddy requires three essential plant nutrients: nitrogen, phosphorus and potassium. Most paddy lands have a moderate quantity of such nutrients, but if they are deficient, organic manure or artificial fertilizers have to be used.

6. Labour:

Paddy cultivation is extremely labour-intensive, therefore, requires more labour in comparison to other cereal crops. Labour is necessary for: preparing the field, weeding, sowing, transplanting, manuring, harvesting, threshing, winnowing and milling. For rice cultivation large number of cheap labour is required.

**WHEAT**

1. Temperature:

The temperature required for wheat during growing season is around 15.5°C. The weather should be warm and moist during the early stage of growth and sunny and dry in the later stages. The average temperature of the hottest month should not exceed 20°C. A frost-free period of 100 days is usually required but some fast-ripening varieties may mature only in 90 days.

2. Rainfall:

The amount of rainfall required for wheat cultivation varies between 30 cm and 100 cm. The major wheat lands of the temperate regions have an annual rainfall of 38 cm to 80 cm. The spring wheat region of Canadian Prairies only receives around 46 cm of rainfall, but it comes in the early summers when the wheat is growing. Wheat is also grown in areas having lesser amount of rainfall, i.e., 25 cm. This has been done by adopting dry farming method. Also where irrigation facil­ities are available, wheat is cultivated in dry lands also.

3. Soils:

The soil suitable for wheat is either light clay or heavy loam. The world’s best wheat comes from the chernozem soils in the ‘Black Earth’ region of the Ukrainian Steppes, the dark brown soil of North America and also the grey brown podzolic soils of the deciduous forest region.

4. Topography:

Wheat is grown in plain as well as in rolling topography, which provides adequate drainage and at the same time facilities of the use of machinery. The world’s largest commercial wheat lands are the undulating temperate grasslands of Steppes, Prairies, Pampas and the Australian Downs.

**BARLEY**

The cultivation of barley is done in the following areas:

1. Temperature:

Barley can be grown in high latitudes, even beyond the Arctic Circle. It is grown in Finland up to 70° North latitude where growing season is very short. Barley is grown in desert areas having semi-arid climatic conditions. Barley crop is having tolerance for arid conditions. Barley can be grown in upland regions also because it can ripen in cool temperatures.

2. Topography:

In mountainous, barley is grown on steep hill slopes.

3. Soils:

The most suitable soil for barley cultivation is the light, sandy or dry soil. But it is also grown on dry chalk and limestone regions in Europe.

**MILLET**

1.Temperature

Pearl millet is a summer annual crop well-suited for double cropping and rotations. It germinates well at soil temperatures of 75 to 90 degrees F. Emergence occurs in 2 to 4 days under favour.

2. Soil

Pearl millet can be grown on a wide variety of soils ranging from clay loams to deep sands. Yields and grain quality, however, are best on deep, well-drained productive soil.

**TOMATO**

Climatic Requirements

Tomato is a warm season crop, it requires warm and cool climate. The plants cannot withstand frost and high humidity. Also light intensity affects pigmentation, fruit colour, fruit set. The plant is highly affected by adverse climatic conditions. It requires different climatic range for seed germination, seedling growth, flower and fruit set, and fruit quality. Temperature below 100C and above 380C adversely affects plant tissues thereby slow down physiological activities. It thrives well in temperature 100C to 300C with optimum range of temperature is 21-240C. The mean temperature below 160C and above 270C are not desirable. The plant doesn’t withstand frost, it requires low to medium rainfall, and does well under average monthly temperature of 21 to 230C. Avoid water stress and long dry period as it causes cracking of fruits. Bright sunshine at the time of fruit set helps to develop dark red coloured fruits.

**Soil Requirement**

Tomatoes do very well on most mineral soils, but they prefer deep, well drained sandy loams. Upper layer of soil should be porous with little sand and good clay in the subsoil. Soil depth 15 to 20cm proves to be good for healthy crop. Deep tillage can allow for adequate root penetration in heavy clay type soils, which allows for production in these soil types.

Tomato is a moderately tolerant crop to a wide pH range. A pH of 5.5- 6.8 is preferred. Though tomato plants will do well in more acidic soils with adequate nutrient supply and availability. Tomato is moderately tolerant to acid an soil that is pH of 5.5. The soils with proper water holding capacity, aeration, free from salts are selected for cultivation.

Soils extremely high in organic matter are not recommended due to the high moisture content of this media and nutrient deficiencies. But, as always, the addition of organic matter to mineral soils will increase yield.

**Pest Management**

Following are the few major pest of tomato :

Control measures of tomato pest is given as below: -

**Leaf eating caterpillar**

Control measure

Spraying of cypernethrin at the rate of 3-4 ml or for Phosphamidon (85 SL) 5 ml per 10 litre of water at the interval of 8-10 days.

**Tomato fruit eating catre piller/tomato fruit borer**

Control measure

Spraying of monocrotophos (36 SL) 5 ml/ 10 litre of water at the interval of 8-10 days. Trichograma and campoletic cloride as a predator and heliocil as biological control.

Aphids

It can be control by spraying dimethoate (30 E.C.) 10 ml/10 litre of water. The controls vary from state to state and region to region. The local agricultural chemical manual will list controls and rates for each pest.

**ONION**

Climatic Requirements For Onion

Fortunately, it is possible to select varieties suitable to a wide range of climatic conditions. The most tender sorts of the foreign types, as the Bermuda onions, thrive in some parts of Texas, Florida and Southern California, and do well at the North when started under glass. They often, too, produce excellent crops when sown in the open, under the most favorable conditions. All the American varieties thrive in the northern states, and with proper culture generally do well in the South. The multipliers or potato onions are thoroughly at home throughout the South, and with some winter protection may be grown for early bunching in the North. The Egyptian or Perennial Tree onion is hardy in the North, even without protection.

While this vegetable may be grown successfully under a wide range of climatic conditions, it succeeds best in temperate regions without great extremes of heat and cold. When grown in the far South, as in Texas, advantage is taken of fall and winter. The crop is planted in September and harvested in March and April. From 130 to 150 days are required to mature bulbs of the various varieties. A bountiful supply of soil moisture is necessary early in the season, when the plants make very rapid growth. A dry soil and low humidity are important for ripening, harvesting and curing the bulbs.

**Soil**

Land to be used in growing onions should be practically level to prevent damage from washing. The seeds, sets, or young, shallow-rooted plants are easily washed out on sloping lands. The soil should be retentive of moisture and yet well drained, friable, easily worked, fertile and free from stones and rubbish which would interfere with the proper use of drills, hand and wheel hoes.

Vast areas of muck and peat soils are devoted to the culture of onions. The crop is doubtless grown at less expense in these soils, which abound in vegetable matter, than in other types requiring more manure and fer-tilizer and a greater expenditure of labor. Their dark color causes them to warm up rapidly in the spring, and thus they favor early planting, which is universally regarded as important. These soils, rich in organic remains, retain moisture, so that drouth seldom curtails the crop to any great extent.

Sandy loams, when properly enriched with humus and plant food, furnish excellent conditions for onions. They are easily worked and produce solid, heavy bulbs of superior keeping quality.

Clay soils should be avoided. They become too hard and compact for best results. Clay and alluvial loams, when properly "handled, yield profitable crops, but the supply of humus must be liberal to prevent serious baking. Incrustation is especially damaging when it occurs before the plants are up or large enough to permit thorough tillage.

**BEANS**

Soil and Climatic Conditions of Growing Beans

Temperature:

Common beans grow within a range of temperatures of 17.5-27°C. Hotter temperature above 30°C may cause the flower buds to fall and in temperatures above 35°C, seeds might not form. Beans are sensitive to night frost. Common beans are usually grown at altitudes between 600 - 1950 m.

French Beans grow within the ideal temperature range of 20-25°C, but can be grown in temperatures ranging between 14 and 32°C. Extreme temperatures result in poor flower development and poor pod set. However, French beans mature faster in warmer areas. French beans can be grown between 1000 and 2100 meters above sea level.

Rainfall:

Beans require a moderate well-distributed rainfall (300-400 mm per crop cycle) but dry weather during harvest is essential. Prolonged dry conditions or extreme wetness are harmful to beans.

Climbing types will yield well in areas of high rainfall but the dwarf types are more sensitive to high soil moisture levels.

Suitable soil types range is from light to moderately heavy and to peaty (with organic matter) soils with near-neutral pH and good drainage. Common bean is sensitive to salt.

Rain fed cultivation is possible in areas with well distributed, medium to high annual rainfall (900-1200 mm). But to maintain a continuous production especially during the dry season, irrigation is essential. During the dry season up to 50 mm of water per week is required. This could be applied through furrow or overhead irrigation. French beans grow best on well drained, silty (fine grained soil) loams to heavy clay soils high in organic matter.

**COCOA**

Suitable Factors Required for the Cultivation of Cocoa are : 1. Climate, 2. Shade, 3. Protection from Strong Winds, 4. Soil and 5. Labour!

Climate:

Cocoa is essentially a plant of tropical region. The equatorial environment with high temperatures and heavy rainfall is the best. An annual rainfall of 200 to 350 cm is ideal but it will grow in areas with 150 cm of rain. The cocoa farming is best developed in regions having about 27°C of average annual temperature.

Shade:

Although cocoa requires much heat but direct sunlight is harmful to it. Some protection is necessary, especially when trees are young. In cocoa plantations, tall banana plants or other shady trees are usually grown to provide shade.

Protection from Strong Winds:

Strong winds are harmful for cocoa cultivation because they often blow off unripe pods which will be wasted. Hurricanes also do great damage to the cocoa trees in the West Indies and Central America.

Soil:

Cocoa can be grown on a wide range of soils providing they are fairly deep and well-drained. Loamy soils rich in iron and potassium are ideal but light clays are also suitable. The heaviest crops come from cocoa grown on newly cleared virgin equatorial forest soils with high humus content but manuring in long-established groves enhances the yields.

Labour:

Cocoa cultivation and processing are labour-intensive. The cocoa tree bears fruit all the year round but beans are usually harvested during the drier season, i.e., from September to February in West Africa, or April to December in Brazil.

Cutting down the pods and splitting them, fermenting, drying and sacking the beans all require much manual labour.

6 .Transport

Since much of the cocoa produced is exported, a good network of transport is necessary. The cocoa-producing regions are humid regions; therefore, it is very difficult to maintain the roads and railways. Excessive rain causes great damage to keep roads in good running condition.