Groundnut (Peanut) Production

Educational slides for BSc students

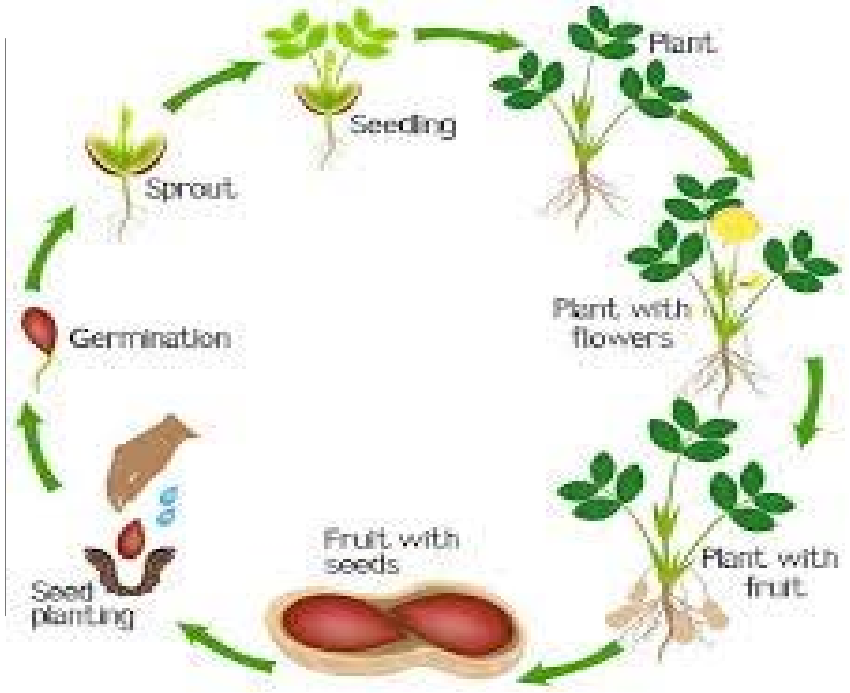
Arachis hypogaea L.

Introduction

- Scientific name: *Arachis hypogaea* L.
- Family: Fabaceae
- Annual legume and oilseed crop
- Important source of edible oil and protein

Plant Growth Habit

- Herbaceous annual plant
- Growth types: bunch, semi-spreading, spreading
- Height: 30–60 cm
- Well-developed taproot system



- Erect type – Spanish Valencia types especially Roxo and Red Beauty varieties.
- Spreading type – Virginia types especially Asyria Mwitunde and Ugandan Makulu varieties.

Erect type *Spreading type*

Figure 2: Groundnut types

Source: ICRISAT

Figure 3: Sample of spreading type groundnut in the field

groundnuts can be categorised into two main growth pattern types: **bunch** and **runner**.
Runner groundnuts have long branches with nuts growing or 'running' all along their length.
Bunch groundnut plants, on the other hand, produce all their nuts at the end of these branches, in a bunch.

- **Runner / spreading type**

It is the larger variety and is preferred because of the high yields, it matures in 90 – 100 days.

Figure 13: Growth pattern of runner / spreading type of groundnuts

- **Bunchy / erect type**

Are small, tastier and a highly marketable variety. They mature in 60 – 75 days.

Figure 14: Growth pattern of bunch / erect type of groundnuts

Flower Characteristics

- Yellow, papilionaceous flowers
- Hermaphrodite and self-pollinated
- Flowers borne in leaf axils
- Short-lived flowers

Figure 15: Groundnut crop before flowering (top), and during flowering (bottom)

The crop usually grows slowly until about 40 days after planting.

• Growth is more rapid between 40 to 100 days. During this period a four to five-fold increase in groundnut foliage occurs.

• Groundnuts start to flower about 25 to 40 days after planting. However, groundnuts can flower over a long period (20 – 60 days), depending on moisture availability and temperature.

• The flowering period is considerably shorter in bunch type of cultivars than in spreading types.

• The flowers are born in axil of leaves mostly near the base of plant.

Reproductive Mechanism (Geocarpy)

- Fertilization occurs above ground
- Gynophore (peg) elongates after fertilization
- Peg penetrates soil
- Pod develops underground

Figure 17: Groundnut pegs

The pods have rounded ends and are most commonly 2.5-5.0 cm long with two or three seeds; the pods hold the seeds and have a thin, netted, spongy shell. The seeds are nearly round and have a papery seed coat that ranges in colour from whitish to dark purple.

It is a self-pollinated crop i.e. its own pollen fertilises the ovule.

After fertilization stalk of ovary elongates and forms peg which contains fertilised ovules at the tip.

The pegs penetrate the soil up to a depth of 7cm and then grows horizontally when the ovary starts developing as a pod containing seeds.

Normally, 60-80 days are required for pod development from flowering to maturation in spreading types, and slightly less than that at 50-60 days in bunch types.

• Vegetative development declines during pod filling.

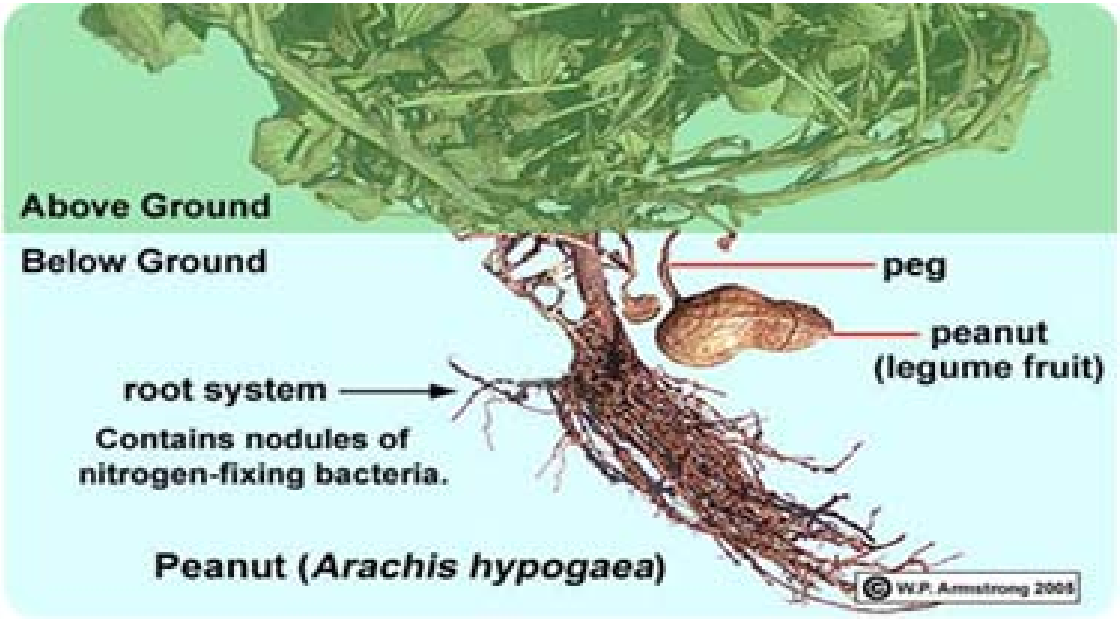


Figure 16: Features of groundnut roots

Method of Propagation

- Propagated by seeds (kernels)
- Use mature and healthy seeds
- Seed treatment recommended
- Good germination essential

Climatic Adaptation

- Groundnut is adapted to tropical and subtropical regions (The crop grows well in warm tropics and subtropics below 1500 M above sea level)
- Requires warm temperatures throughout the growing season
- Optimal temperature range: 25–30 °C with growth stopping at 15ºC
- Sensitive to frost and prolonged cold conditions
- The plant does not tolerate frost and cooler temperatures, which lead to a delay in flowering and seed formation.

Many of peanut fields were later planted due to excessive rains and increased soil moisture conditions. In addition, our dryland peanuts experienced extreme stress due to drought conditions and insect pressure, specifically spider mites. The combination of these factors has delayed the harvest of many acres of peanuts, particularly the dryland peanuts. A number of peanut farmers are waiting on their "second crop" of peanuts to mature, as much as possible, prior to digging. Many dryland growers lost their "first crop" of peanuts due to the various stresses the plant experienced during the growing season. After the initial stress and as growing conditions improved, the peanut plant began pegging again resulting in later pod set. These later set peanuts are the ones many growers are opting to wait on. While we wait for this second crop to gain color and weight we need to be mindful of our soil temperatures and observe the extended forecast. Keeping these environmental conditions in mind, we can manage the harvest of this later peanut crop and decrease the risk of cold damage.

Importance of site selection

Site selection helps in identifying a field that is most suitable for groundnut farming. In general, flat or gently sloping land is usually preferred so as to avoid poor-draining, low-lying land where flooding occurs, creating conditions that can lead to aflatoxin contamination and other diseases. It is advisable that, if possible, one should plant on land that was not cultivated with legumes the previous year. Crop rotation helps to reduce carry-over diseases, including *Aspergillus flavus*, the mould that produces aflatoxin.

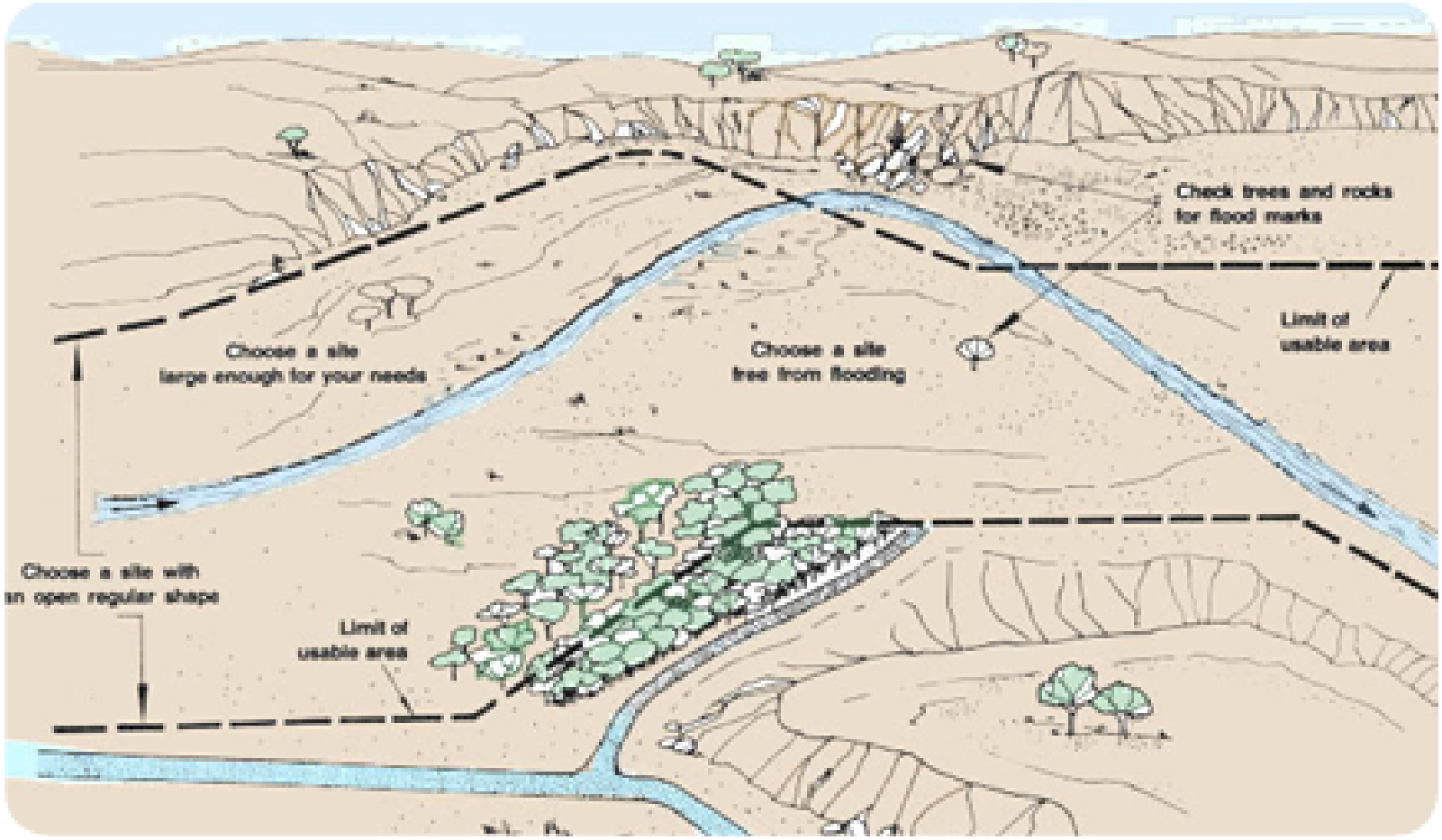


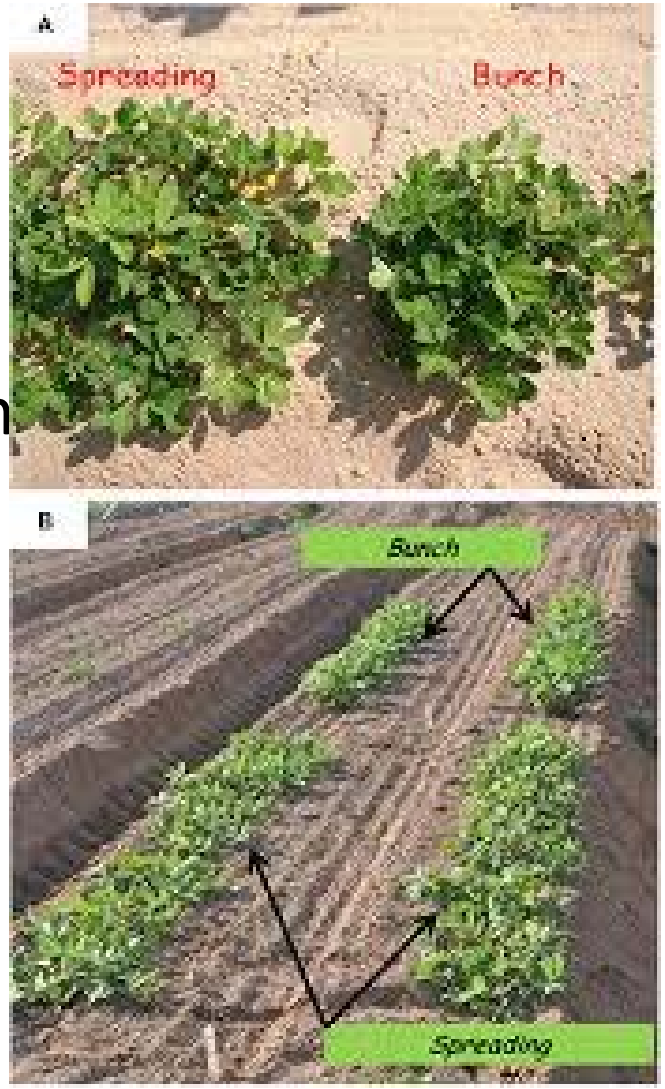
Figure 6: Considerations on site selection

Soil Requirements

- Light-textured soils preferred
- Grow best in sandy loam
- Well-drained and loose soil
- pH range: 5.8–7.0
- Avoid poorly drained and hard clay soil.
- Do not plant peanuts in the same space where you have grown other legumes (beans or peas) in previous years.

Planting and Spacing

- Planting time depends on region
- Bunch type: 30–40 cm × 10–15 cm
- Spreading type: 45–60 cm × 15–20 cm
- Proper spacing improves yield



Crop Management

- Early weeding is essential
- Avoid soil compaction
- Mulching may be beneficial

- At pegging, avoid disturbing the soil near the plants: at this stage pull weeds by hand and avoid use of hoes.

Figure 39: Hand weeding of groundnut crop

Gapping

This is the filling up spaces where groundnuts failed to germinate.

Thinning

This is the removal of excess groundnut plants which are not healthy to allow the remaining plants to grow healthy and vigorously.

Mulching

Mulching is use of plant material such as straw, leaves, crop residues, green manure crops, sawdust, stones or plastic planes that is spread upon the surface of the soil. Mulch can be used in fields before and after planting, as well as around young crop plants. It is especially useful for growing crops in dry areas, during dry-season cropping, and in places where the soil is easily eroded by heavy rains. Where soil erosion is a problem, slowly decomposing mulch material (low nitrogen content, high C/N-ratio) will provide a long-term protection compared to quickly decomposing material.

Light earthing-up for peg penetration

Earthing up

- Earthing up is done immediately after final weeding and gypsum application (i.e. 40-50 days after planting or at initial pegging stage).
- This is done to make the soil compact around effective root zone which increases yield by enabling all the pegs formed to develop into pods.
- It is particularly useful for varieties known to develop aerial pegs.
- Many aerial pegs will be unproductive in un-earthed up plots as they will not enter the soil to develop into pods.
- The practice also helps the late formed pegs to enter the soil to form pods but while waiting for the late formed pods to mature, earlier set ones may sprout in case of lack of dormancy or the peg attachment may weaken resulting in their loss into the soil at the time of harvest.
- Earthing up is an essential operation in groundnut cultivation to enhance the productivity by destroying the weeds and increasing penetration of roots.

Figure 40: Earthed up groundnut crop

ure 41: Groundnut crop which was not earthed-up exposing the pegs that forms the pods

Nutrient Management

- Biological nitrogen fixation (they do not need additional nitrogen fertilizer)

However, if you plant them in a location where peanuts have never been grown before, it might be a good idea to add a groundnut inoculant to the soil at the time of planting.

- Phosphorus for root and pod growth
- Applying a fertiliser with a source of calcium at the time of planting will be needful.
- • Groundnuts need calcium in the upper 15cm of the soil where the pods grow. Calcium fertiliser should be applied at a rate of about 150 - 250kg per hectare.

Harvesting

- Maturity: 150 –90days
- Yellowing of leaves indicates maturity
- Stop watering the plants 10 days to two weeks before harvesting.
- Pods harvested by uprooting
- Proper drying required after harvest

Cropping System and Life Cycle

- Groundnut is an annual crop
- Entire life cycle completed within one growing season
- Crop duration ranges from 90 to 150 days
- Often included in crop rotation systems

Importance in Sustainable Agriculture

- Improves soil fertility through nitrogen fixation
- Suitable for crop rotation and intercropping
- Enhances farm income in warm regions
- Contributes to food and nutritional security