

GROUNDNUT (*Arachis hypogaea*)



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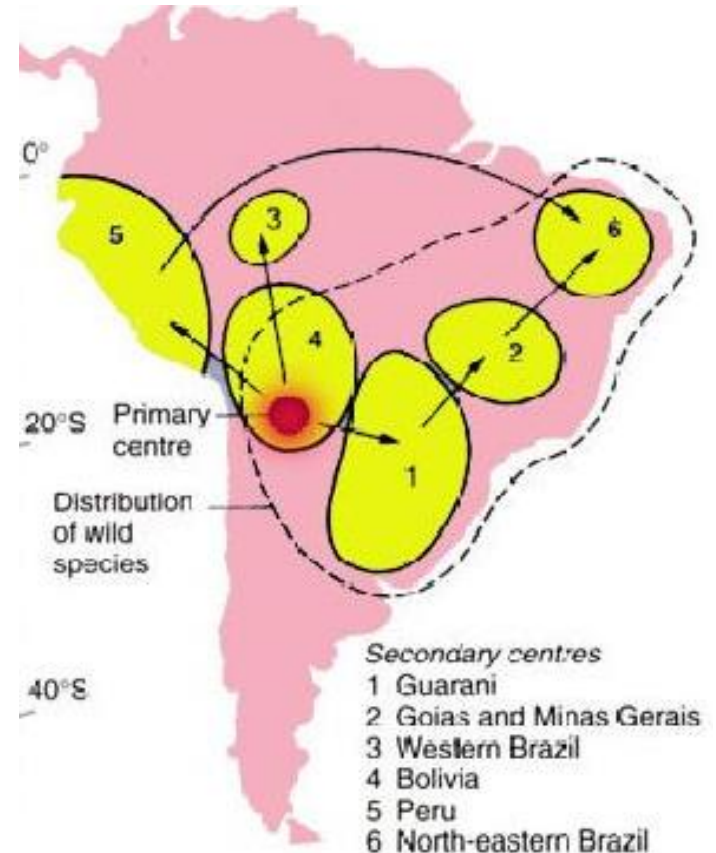
IMPORTANCE OF THE CROP

- ❖ Common name : Groundnut, Peanut, Monkey nut, Earth nut, Manila nut, moong fali (Hindi), chinabadam (Odia).
- ❖ Greek word ***Arachis*** (Meaning legume) and ***hypogea*** (meaning below the ground).
- ❖ Groundnut is an important oil and protein source to a large portion of the population in Asia, Africa and the America.
- ❖ It is a self -pollinated, annual, herbaceous legume.
- ❖ Groundnut, **KING OF VEGETABLE OIL SEEDS** in India, occupies preeminent position in national edible oil economy.
- ❖ Important source of edible vegetable oil in India and world.
- ❖ **India ranks second** in ground production.
- ❖ In India, among oilseeds its area and production are maximum. Nearly 1/5th area of total oilseed area in the country is reserved for groundnut.
- ❖ Nearly 81% of the kernels are used for oil extraction, 12% used for seed purpose, 6% - raw materials, 1% - exported in terms of Hand picked selections (HPS).

- ❖ Its importance lies in high **oil content (45%)** and high **protein (26%)** – **highly concentrated food (5 cal/g)**.
- ❖ Groundnut oil has oil desirable qualities of edible oil and is **rich in all types of vitamin B except B₁₂, but it is devoid of vitamin A**.
- ❖ It is also rich in minerals viz. P, Ca, Mg including micronutrients like Fe and Zn.
- ❖ Preparation of food products like chikkis, G.nut milk, G.nut butter etc.
- ❖ Inferior oils are used for making soaps, detergents, Cosmetics, paints, candles, Lubricants and some of the medicines.
- ❖ **Groundnut cake** is used as nutritional and palatable **cattle feed (5-7% N, 1.5% P & 1.3% K)**.
- ❖ The peanut haulms contain crude protein 8–5%, lipids 1–3% and minerals 9– 10%. These are used as cattle feed either in fresh or in dried stage or preparing hay or silage.
- ❖ Groundnut crop add sufficient quantity of organic matter to the soil as most of the leaves are shed just before harvesting. In some areas, it is used as a **green manure crop**.
- ❖ Groundnut is able to **fix atmospheric nitrogen @ 60 – 100 kg N /ha within 1 season**.

ORIGIN AND HISTORY

- ❖ Center of origin of Groundnut is **Brazil** in South America i.e., Matogrosso a place in Brazil.
- ❖ It appears that Portuguese introduced the groundnut plant from Brazil into Africa.
- ❖ At the beginning of 16th century, groundnut was introduced into India by Jesuit fathers who followed Vasco De Gama shortly after his first landing in India.



AREA AND PRODUCTION

Major groundnut producing countries are China, India, Nigeria, USA, Indonesia, Argentina, Sudan, Senegal and Myanmar. World average productivity is 1.66 t/ha. India ranks first in area and second in production.

Sr. No.	Country	Area (Lakh ha)		Production (Lakh tons)		Yield (Kg/ha)	
		2014-15	2015-16	2014-15	2015-16	2014-15	2015-16
1	China	46.00	46.00	164.80	165.00	3580	3590
2	India	47.69	45.55	74.02	67.71	1552	1486
3	Nigeria	27.70	25.00	34.10	30.00	1230	1200
4	USA	5.40	6.30	23.50	27.20	4400	4310
5	Sudan	12.50	21.80	9.60	18.70	770	860
6	Myanmar	8.90	8.90	13.80	13.80	1550	1550
7	Indonesia	6.30	6.20	11.50	11.30	1830	1840
8	Senegal	8.80	11.40	6.70	10.70	760	940
9	Niger	7.80	7.40	4.00	3.50	520	470
10	Cameroon	4.70	4.00	6.40	5.50	1360	1380
Others		64.71	64.75	49.98	50.29	772	777
World		240.50	247.30	398.40	403.70	1660	1630

(Status paper on groundnut, 2017)

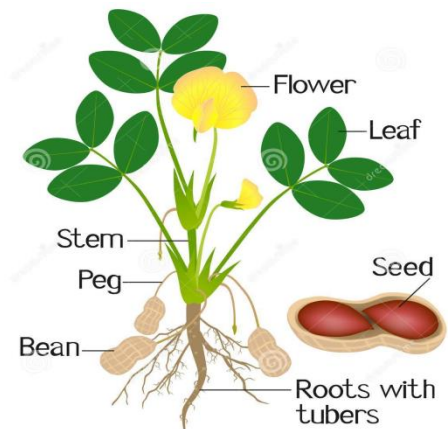
- Groundnut accounts for 28% of the total area & 36% of total oilseed production in the country.
- The major Groundnut producing states are Gujarat, A.P., T.N., Karnataka & Maharashtra.
- But its productivity in India is very low i.e. 1.02 t/ha, in comparison to that of China (3.43 t/ha) and USA (4.34 t/ha).

Sl. No	States	Area (Lakh Hectares)	Percentage	Production (Lakh MT)	Percentage	Yield (kg./per Hectar)
1.	Andhra Pradesh	24.01	28.75	20.71	23.39	863
2.	Gujarat	18.84	22.56	20.68	23.36	1098
3.	Karnataka	12.28	14.70	10.98	12.40	895
4.	Madhya Pradesh	2.74	3.28	3.07	3.47	1122
5.	Maharashtra	6.52	7.81	7.55	8.53	1158
6.	Tamil Nadu	11.29	13.52	15.75	17.79	1395
7.	Rajasthan	2.40	2.87	2.68	3.03	1116
8.	All-India	83.51	-	88.54	-	1060

Source: Directorate of Economics & Statistics, Department of Agriculture and Co-operation, Ministry of Agriculture, 2015-16. Among the major states, Andhra Pradesh led in area with 28.75 per cent of the total area under groundnut in India, followed by

BOTANY OF THE PLANT

- Family: ***Leguminosae/Fabaceae***
- Erect type plant (60-70 cm) and Spreading type plant (30 cm)
- **Deep tap root system** with profuse nodulation (If properly infected by *Rhizobium*)
- The solitary **flowers are axillary and self pollinated.**
- Post pollination growth of **meristematic tissue** from the base of the flower called **gynophores** (also called **peg**) carrying fertilised ovary is pushed into soil.
- After its entry into the soil, the ovary grows, develops into a fruit called **pod**.
- The pod is **indehiscent** with soft fibrous **shell** (Pericarp) and has 1-5 kernels, which have thin pink testa and two prominent oil-filled cotyledon.



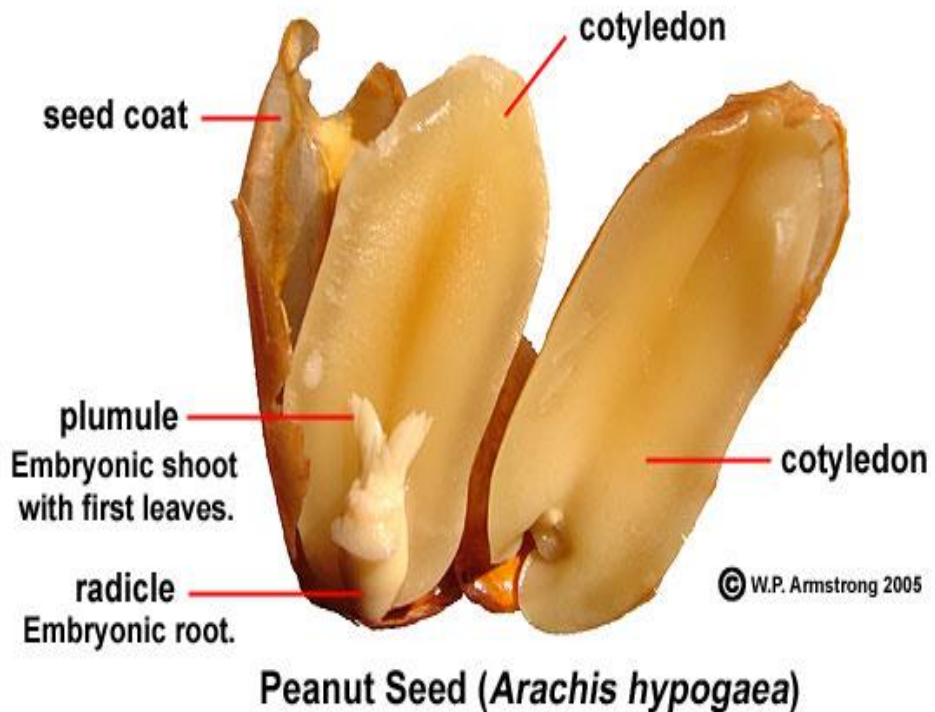
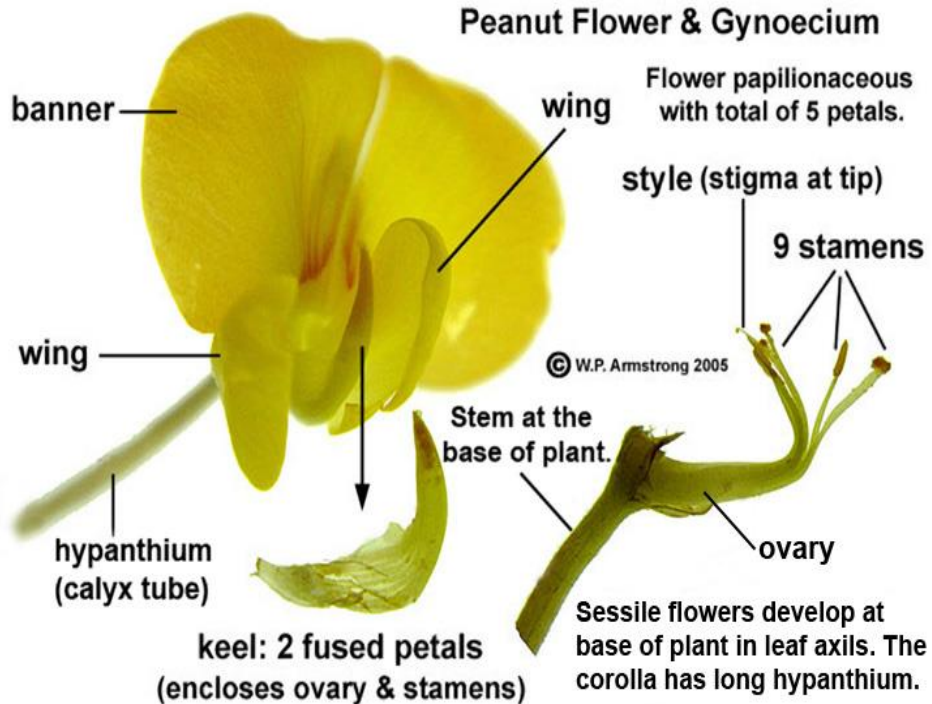
Peg with tiny, fertilized ovary at its tip. It penetrates soil with developing ovary (pod) at its tip.

pegs

Peanut pod enlarges and matures under the ground.

Fertilized seed pod (legume) with 2 seeds.

Peanut Flower & Gynoecium



CLASSIFICATION

Groundnut (*Arachis hypogaea*)

Subspecies *hypogaea*

**Variety *hypogaea*
(Virginia type)**

Variety *hirsuta*

Subspecies *fastigiata*

**Variety *fastigiata*
(Valencia type)**

**Variety *vulgaris*
(Spanish type)**

COMPARATIVE CHARACTERS OF VIRGINIA & SPANISH/VALENCIA

CHARACTER	Virginia	Valencia/Spanish
Seed size	Medium to very large	Small to medium
Seed per pod	Usually 2, occasionally 3	Usually 2-4, rarely 3
Seed dormancy	Moderately present	Little to none
Branching	Moderate to profuse	Sparse to moderate
Flower bud on main axis	Present	Absent
Flowering pattern	Alternate	Sequential
10 – lateral branches	Longer than main stem	Shorter than main stem
Growth habit	Spreading to semi-spreading	Bunch
Growth period	Long (130-175 days)	Short (90 – 105 days)
Peak flowering	8-12 weeks	6 – 10 weeks
Leaf color	Dark green	Pale green
Leaflet size	Small	Large
Leaflet apex	Pointed	Rounded
Pod distribution	Scattered	Close to the base
Ability to growth after seed	Retains growing point if pods are detached	Usually dies
Linoleic acid	Low	High

COMPARATIVE CHARACTERS OF VALENCIA AND SPANISH

Characters	Valencia	Spanish
Secondary lateral branches	Absent	Present irregularly to primary branches
Stem and petiole color	Purple	Green
Hairiness	Less	More
Leaflet color	Dark green	Light green
Inflorescence	Single	Compound
Seeds per pod	Usually 3-4	Usually 2
Constriction, reticulation & beak on the pod	Less prominent	More prominent
Shell thickness	Thick	Thin
Testa color	Red to purple	Rose
Maturity	90 – 95 days	100 -105days

VARIETIES

Groundnut var. now under cultivation fall under

Three botanical groups: **Spanish, Valencia, Virginia.**

Three habitat groups:

- Bunch (Spanish/ Valencia)
- Semi spreading (Virginia bunch)
- Spreading (Virginia runner)

The recommended var. of groundnut are JL – 24 (Phule pragathi), TAG -24, Greeshma, Prasuna, Abhaya, Apoorva, ICGV-86590, K – 134, TPT-2, TPT -3, ICGV 86325, DRG 12, Kadiri 4,5,6, Jcc-88, ICGS 11, ICGS - 44 ICGS – 76, Kalahasti, Narayani, TG 26, TMV 2, J-11, Gaug – 1

CLIMATE AND SOILS

Climate

Groundnut is predominantly a crop of the tropics.

The approximate limits of present commercial production are between latitudes **40° N and 40° S** and up to an attitude of **1065 m**, where **rainfall during the growing season exceeds 500 mm**.

Rainfall

- From the productivity of groundnut in several countries, it is evident that semi – arid and arid regions with 500 – 700 mm rainfall during crop period are ideal for groundnut.
- Rainfall should be adequate during flowering and pegging stages.
- Ideal RF for successful groundnut crop would be
 - 80 – 120 mm, during summer to facilitate preparatory cultivation
 - 100 – 120 mm, at sowing
 - 200 mm, from flowering to peg penetration
 - 200 mm, early pod development to pod maturity
- Rains at harvest cause germination of kernels in non-dormant Spanish and Valencia cultivars besides problem in pod drying.

Temperature

- Soil temperature 18°C delays emergence of seedlings. The embryo is killed above 54°C .
- Groundnut performs well in dry temperature range between **24°C & 33°C** . but it can survive up to 45°C .
- Ideal temperature for **reproductive stage is between $24 - 27^{\circ}\text{C}$**
- Rate of pod growth will be maximum between 30°C & 34°C .

Light

- Groundnut is **day length insensitive plant**.
- About 60% solar radiation for 60 days after emergence appears to be critical.
- Low light intensity
 - Prior to flowering, slow down the vegetative growth and increases the plant height.
 - At early flowering, leads to flower abortion.
 - At pegging, reduces peg and pod number & pod weight.
- **Flowering phase is more sensitive to reduced light intensities.**
- In the absence of soil moisture stress, clear days have greatest potential for optimum growth and development leading to high pod yield.

SOILS

Groundnut can be grown on all types of soils such as sandy, sandy loam & heavy black soils. It thrives best on **sandy loams**.

- Most suitable soils for groundnut production are **well-drained light sandy loams** with an **ample supply of calcium and moderate organic matter**.
- Heavy and stiff clay soils are not desirable as they tend to become hard during dry weather thereby interfering with peg penetration into the soil and also makes the harvest extremely difficult.
- Groundnut is one of the most acid tolerant crops with a critical **pH range of 5 – 5.5**.
- It is moderately sensitive to soil salinity & highly susceptible to water logging. Gujarat, Southern Rajasthan (Chitorgarh, Udaipur & Jhawar)

TILLAGE

- Land preparation for groundnut depends on the soil type and onset of monsoon for rainfed crop and on the previous crop grown for irrigated crop.
- Light red soils are usually ploughed twice with the summer rains followed by 2 – 3 Harrowing.
- In general, deep ploughing of light soil once or twice results in higher pod yield than repeated shallow ploughings for rainy season crop as deep ploughing aids in higher rainwater storage in root zone to minimize the adverse effect of drought during the crop season.
- In A.P. , black soils are only harrowed (4 – 5 times) several times without any ploughing.
- For irrigated crop, one light ploughing (even at high soil moisture content to hasten soil drying) followed by harrowing for 3 – 4 times at 2 – 3 days interval.
- Optimum depth of ploughing is 15-20 cm. If too deep ploughing is done, it leads to development of pods in deeper layers which makes the harvesting difficult.

SEASONS

Kharif

- 90% area is under groundnut is during *kharif* under **rainfed** conditions.
- **Average yields are comparatively low** due to erratic behaviour of monsoon i.e. late onset of monsoon, dry spell during critical crop growth stages, heavy rains at later stages or early withdrawal of monsoon.
- Pest & disease incidence is also high in *kharif*. The climate will be cloudy with lesser sunshine.

Rabi

- Groundnut cropping during *rabi* is limited to areas **where winter is not severe & temp. do not grow below 15 °C**. It is confined to states of T.N, A.P, Karnataka, Odisha, Maharashtra and Gujarat.
- It is grown under irrigated on uplands or with supplemental irrigation in rice fallows.
- Sowing period extend from October to December.
- **Second half of November** is the ideal sowing time.

Summer

- Groundnut yields are three times higher during summer than *kharif* due to ideal climate as clear sky, good light intensity and less incidence of pest and diseases. It is also grown completely under irrigation throughout the crop period.
- Drymatter production is nearly 25.7 g/day as against 14.8 g/day in *kharif*.
- Sowing period: mid-Dec to mid-Jan is ideal for higher yield.

SEEDS AND SOWING

Seed Selection

- Germination < 85% is not considered satisfactory.
- Selected pods are thoroughly cleaned, dried, packed preferably in gunny bags & stored in a well ventilated place.
- Groundnut pods for seed purpose are usually hand shelled about a week in advance of sowing. The viability of seed will be lost if shelled long before seeding .
- Shellers are also used for shelling the pods to minimize the cost of groundnut production.
- After shelling, shrivelled and damaged seeds are rejected by hand picking.
- Seeds retained on 5mm sieve (100 Kernel wt. above 27g) germinates early and produce vigorous plants for high pod yield.

Seed Treatment

- Seed treatment against seed and soil born diseases is essential.
- Seed treatment with Thiram @ 3g/kg, Bavistin (2g/kg) or Dithane M – 45 (3g/kg).
- Granulated Rhizobium strain can also be sown with seed in the furrows.

Seed Rate and Spacing

	Seed rate (kg/ha)		Spacing	
	Bunch type	Semi spreading & spreading	Bunch type	Semi spreading & spreading
Kharif (rainfed)	120	150	30x10 cm	30 x15 cm
Rabi (irrigated)	150	180	22.5 x 10 cm	30 x 10 cm
Summer (irrigated)	150	180	22.5 x 10 cm	30 x 10 cm

Method and depth of sowing

- Groundnut seed can be sown either by using mechanical or bullock drawn **seed drill** or by dropping the seed in **plough furrow** behind the country plough.
- **Hand dibbling** is also adapted to a limited extent.
- *Kharif*:- drilling or dropping seed in plough furrows at 5 -7 cm soil depth.
- *Rabi* & summer: - Dropping seed in plough furrow at 4 – 5 cm soil depth.
- Depth:- In light, soils, the seeds are sown to a depth of 5 -7 cm and in heavier soils to a depth of 4 -5 cm

NUTRIENT MANAGEMENT

Manure: Apply 10 t well decomposed FYM and incorporate it into soil just before the onset of monsoon.

Nitrogen

- Legume crop, hence fixes atmospheric N. Strains available are:- **NC-92 & TAL 1000,THA 205**
- Around 200 kg N/ha can be fixed under ideal conditions.
- **Rainfed crop: 20 kg N/ha**
- **Irrigated crop: 30 kg N/ha** in two equal splits 1st at sowing and 2nd (top dressing) at 30 DAS.

Phosphorus

- The total amount of 'P' uptake by groundnut plant is relatively small compared to N & K.
- It promotes root growth and multiplication of *Rhizobium*.
- Phosphorus is applied when the available phosphorus is < 35 kg/ha.
- Optimum doses are **Rainfed – 40 kg P₂O₅ /ha irrigated – 50 kg P₂O₅/ha**

- Entire dose should be applied at sowing along with N by placement preferably using ferti seed drill.
- Single super phosphate is the best source as it contains 16% P_2O_5 , 19.5% Ca & 12.5% S along with some traces of Zn & other micronutrients traces.
- Therefore **response to SSP is higher than with DAP** at equal nutrient basis.
- **Phosphobacteria as *Pseudomonas striata* and *Bacillus polymixa*** solubilizes the native phosphorus and recorded 13-20% increase in groundnut yield.

Potassium

- As most of the Indian soils are rich in K, groundnut in general will not show any significant response to applied potassium.
- There is no necessity for potassium application to rainfed groundnut yielding around 1 t/ha.
- Response is observed only when the available potassium in soil is < 150 kg/ha.
- For **rainfed groundnut** - 40 kg/ha
- For **irrigated crop** - 50 kg K_2O /ha provided N is applied at recommended rate.

Calcium & sulphur

- These two nutrients are absorbed by **pegs & developing pods** and the common source of supply is **gypsum**.
- Adequate Ca is essential in root and pod zones for yield and quality of kernels.
- **Calcium deficiency** leads to **unfilled pods called pops and darkening of plumules** of embryo.
- **Sulphur** is highly essential as it is directly **involved in the biosynthesis of oil**. It improves nodulation of Rhizobium and prevents the premature leaf fall & increase the pod & oil yield.
- Ca & S are supplied to crop through **CaO** or **gypsum** & it has been observed to increase the yield by more than twice depending on its availability in the soil.
- About 1 meq / 100 g soil in the root zone depth and 3.0 meq/100g soil in pod zone are threshold values for calcium sufficiency. About 100 ppm of heat soluble sulphur is the critical limit of available sulphur for groundnut.
- **Gypsum application @ 500 kg/ha near pegging zone as top dressing at flowering (30 DAS) appears to be ideal. If heavy rainfall occurs lighter dose again applied after 2 weeks.**

K: Ca: Mg ratio

- The K:C:Mg ratio is more important than the total amount.
- Increase in conc. of Mg in nutrient solution decrease K uptake by G. nut & also decreases Ca uptake.
- There is a mutual antagonistic effect on the uptake of K, Ca & Mg.
- The ideal ratio is **4 : 4 : 2**.

Zinc, Boron & Iron

ZINC: Zn def. is common on sandy & sandy loam soils. The critical limit of available Zn in soil is <0.6 ppm. Application of **ZnSO₄ @ 2 kg /ha once in 2 years** corrects the deficiency. If it is observed in standing crop, **foliar application of 0.2% ZnSO₄ along with 0.2% lime** can correct the deficiency.

BORON: 'B' def. leads to **HOLLOW HEART**. Deficiency has been reported in light soils of Punjab & T.N. The threshold level of boron is 0.25 ppm. Deficiency can be corrected by soil application of **5–10 kg/ha of boron**. In standing crop, corrected by **0.1% borax spray**.

IRON: Iron chlorosis is largely due to its reduced availability in the soil. Immobilization of iron in the soil may be due to high levels of lime, high PH (>7.6) or high levels of bicarbonates in soil or irrigation. **Spraying of ferrous sulphate mixed with 1% of ammonium citrate** around 50 DAS corrects iron deficiency.

WEED MANAGEMENT

- Weed competition is critical **upto 35 DAS**.
- Yield losses may be to the extent of 70%. , especially under rainfed conditions.
- When **once pegging begins (40 DAS)**, there should not be any disturbance to pegs **through manual or mechanical weeding**.
- Important weed flora in the groundnut crop are *Cyperus rotundus* ; *chloris barbata*, *celosia argentea*, *commelina benghalensis*; *Boerhaavia diffusa* etc.

Cultural management:

- Hand weeding is done twice, **first around 20 DAS & 2nd at about 35 DAS**.
- Inter cultivation usually starts around 10 days after emergence & continues upto 35 DAS at 7– 10 days interval till pegging begins.
- Cost effective weed management under rainfed conditions is, repeated intercultivation (harrowing) upto 35 DAS followed by hand weeding.

Use of herbicide:-

- A mixture of oxadiazon & Dinoseb each @ 1.7 kg /ha gives excellent control of weeds besides reducing stem rot in G.nut.
- Fluazifop (150 – 250 g) is a promising post herbicide for controlling grasses, particularly *cynodon dactylon*, 35 – 40 DAS
- IWM involving the above two appears most effective & economical, provided the crop is not subjected to prolonged drought or soil moisture stress during the crop period.
- Pre-plant incorporation of Fluchloralin @ 1.25 – 1.5 kg/ha
- Pre-emergence application of Pendimethalin @ 0.6-1.5 kg/ha or Alachlor @ 1.5-2.0 kg/ha.

WATER MANAGEMENT

- Groundnut crop is mostly cultivated during *kharif* under rainfed conditions. Irrigated groundnut accounts for over 20% of the total area under the crop in the country & it yields around 4.2 t/ha.
- **Critical stages :-** The period from **peak flowering to early pod development (45 – 75 DAS)** In other words, flowering, peg penetration and pod development stages are the 3 moisture sensitive stages for pod yield. Very early growth phase (upto 20 DAS) is least sensitive.
- **Scheduling of irrigation**
- On **sandy loam soils**, scheduling irrigations at **25% DASM throughout the growth period** results in high pod yield.
- Irrigating the crop at
 - 25% DASM – from pegging to early pod development
 - 50% DASM – at other stages appear to be ideal for high WUE without significant reduction in pod yield.

- An IW/CPE ratio of 1.0 at moisture sensitive stages and 0.6 during other stages.
- The water requirement of crop is between 450 & 650 mm & WUE is 0.6 to 0.8 kg /m³
- If irrigation water is not limiting , then a total of 8 irrigations are adequate for optimal yield. pre –sowing irrigation followed by an irrigation at 25 DAS, 4 irrigations at 10 days interval & final two irrigations at 15 days interval.
- At times of deficit supplies, an irrigation at 25 DAS followed by 2 at 15 days interval between 45 & 75 DAS appears to be minimum requirement & it can minimize yield losses due to soil moisture stress.
- The first irrigation is given at 25 DAS to create moisture stress in the soil which is desirable.
 - to get the good root system.
 - to reduce excessive vegetative growth.
 - Encourage the better nodulation
 - Induce heavy flowering in a single flush (synchronous flowering)
- **Method of irrigation:** The crop is usually irrigated by check basin method. Border strip is more suitable than other methods. Sprinkler irrigation is ideal for g. nut crop on sandy soils.

CROPPING SYSTEMS

Sequential Cropping

- In general, groundnut crop is rotated with cereals commercial crops & oilseed crops. Yield of cereals following g. nut is usually increased by 25%.

Intercropping

- Important Cereal crops grown with groundnut are pearl millet, sorghum & maize.
- Other long duration crops grown with groundnut as intercrops are pigeonpea, cotton and castor.
- Short duration intercrop with groundnut are sesame, sunflower, cowpea, green gram, black gram.

HARVESTING

- Generally **bunch and semi- spreading type** comes to maturity by **100 – 105 days** where as **spreading type** it is **125 -135 days**.
- The prominent symptoms of maturity:-
 - Yellowing of leaves .
 - Necrotic spotting on the leaves
 - Dropping of older leaves / leaf fall.
 - The pods become very hard & tough, they give cracking sound when split open with fingers.
 - The inside of the shell turning dark, with netted venation
 - Seed coat develops pink or red colour (normal colour of the varieties)
 - Raising of the soil to the base of the stem is observed
- Generally harvesting is done by **pulling or lifting the plants from the soil with pods intact**.
- If soil **moisture is adequate**, then **hand pulling**. If **soil is dry**, **tractor or bullock drawn blades are used** for lifting the vines with pods.

- Harvesting before maturity reduces yield & oil percentage & seeds are highly susceptible to aflatoxins.
- If delayed, results in increased incidence of stem rot, weakening of gynophore/peduncle & some of the pods may remain in soil itself at the time of harvesting.

Stripping:

- The **process of separating pods from haulms** in bunch type, if vines are still green, plants is knocked against a cross bar to dislodge the pods.
- The most common method is stripping pods with hand.
- At the time of harvest, pods usually have moisture content around 40 – 50% & hence need to be dried to 10% moisture content for safe storage.
- Drying should be done rapidly to prevent fungal moulding.
- Sun drying is the usual method of drying.
- Summer groundnut should be dried in shade to prevent loss of viability, if it is for seed purpose.

Storage

- Storage at farmer level is invariably in the form of pods. Farmers usually dispose of groundnut pods within a month from drying yard itself. A few store it for 6 months (till *kharif* seeding) in anticipation of high price.
- Pods for seed purpose are stored for 7 – 8 months.
- Pods for seed purpose are stored in earthen pots, mud bins or bamboo baskets or Gunny bags having polythene lining.
- If the seed moisture content is above the critical level of 9% then **Aflatoxin production due to *Aspergillus flavus*** just before the post – harvest drying & mould growth at later stage takes place.

Yield Attributes

- Groundnut kernel yield is the product of pod number, number of kernels per pod and weight of kernels. Kernels per pod vary from 1-5, pods per plant from 5-105 and 100 kernel weight from 28 – 62 g (ICRISAT 1987).
- There is a high positive correlation between the number of mature pods and pod yield.

Yield

Rainfed: - 10 – 15 q/ha

Irrigated: - 20 – 25 q/ha.

Harvest Index: The harvest index in groundnut varies between **0.35 and 0.50** in groundnut.

QUALITY CONSIDERATIONS

1) Volume weight of pods:-

- It is the wt. per unit vol. of pods, which indicates maturity & development of kernels when the pods are disposed by volume.
- Small pods have high volume weight than those of bigger pods .
- The avg. 100 pod weight varies from 73g (7 MV – 2 , Spanish bunch) to 107 g (M -13- Virginia runner)
- Volume weight is influenced by RF distribution at pod development & Ca & S in pod zone.

2) Shelling percentage:-

- Shelling – separation of kernels from pods.
- It is the % of kernels to pods by weight.
- It ranges from 68% in M13 to 76% in TMV-2.
- Irrigated crop has lower shelling % than that of rainfed crop.
- It depends on thickness of the shell, development of kernel & following pattern during the crop period.
- It is influenced by genotype, Rainfall distribution & Ca in pod zone.

3) 100 Kernel weight:-

- It is an indication of proper kernel development.
- Average **100 kernel weight ranges from 30 g** (TMV 2) to 78 g (in M13).
- It is a varietal character with marginal influence of RF distribution, nutrient management &
- ability of translocation of photosynthates from source to sink.

4) Oil content :-

- It generally ranges from **48 – 51 %**
- It depends on temperature during first 3 weeks of pod development, maturity of kernels which is influenced by RF during development stage & 'S' content in soil root zone.
- Virginia runners have higher oil content than Spanish bunch types.

5) Oil quality :-

- The **free fatty acid content in oil will decide the shelf life of oil. Higher the free FA content lesser is the quality** & faster is the deterioration of oil quality.
- Oil extracted from **runner type** have **best quality** due to higher concentration of **TOCOPHEROL**.
- The ratio of saturated to unsaturated fatty acid also decide oil quality. The **ratio of oleic acid to linoleic acid should be > 1.6** to have long shelf life.

6) Colour of pods and testa of kernel :-

- Attractive colour of the pod & testa gets higher price in the markets especially for direct consumption.
- In general, light golden yellow colour of pods are preferred & fetch more price in market. Kernels with pink , rose or light brown testa are preferred.

Grading :-

- For easy marketing of pods & kernels the grading is done.
- Pods are graded into 3 categories
 1. Large/bold
 2. Extra large
 3. Medium size
- Kernels into 4 categories based on size.
 1. Large
 2. Small size
 3. Jumbo(shrivelled)
 4. Splits(ill filled)

EXPORT POTENTIAL

- HPSK & Groundnut oil cake are exported to other countries. But in recent years export of these products are drastically reduced due to increase aflatoxin load in the products & increasing domestic demand.
- China is the largest exporter of HPS kernels followed by USA & India.
- The Indian share for the export of HPS is only 2%
- Groundnut cake is a good vegetable protein & poultry feed. India is exporting large quantity of GN cake in western countries till 1980. Later on the export of Groundnut cake was significantly reduced due to higher levels of Aflatoxins.

THANK YOU

