Lesson 2

Groundnut

Arachis hypogaea

Origin

- South America
- Brazil is considered as centre for many wild spp
- Native of new world crop
- Cultivated extensively in Meso-Amrica & South Amrica
- Remnant pericarp tissue from Peru dates 3900-3750 years before

The word *Arachis hypogaea* (groundnut) has been derived from two Greek words, Arachis meaning a legume and hypogaea meaning below ground (referring to the formation of pods in the soil). Groundnut has never been found in the wild state anywhere and its origin has, therefore, been a matter of considerable speculations and even controversy. There are tow school of thoughts about its origin-one supporting the view that groundnut had originated in Africa and the other tracing its origin to Brazil in South America. According to some literatures it is clear that from the beginning of the sixteenth the west cost of Africa an naturally they introduced it from Brazil into Africa. De Gandolle (1825) stated its origin to be in Brazil (South America). Its introduction in India is considered to be through Jesuit Fathers (Missionaries) who followed Vasco De Gama shortly after his first landing in India i.e. in the first half of the 16th century.

Distribution

- Throughout the tropics and subtropical zones
- India, China, Sudan, Nigeria, Senegal, Zaire, USA
- In India
  - Gujarat
  - AP
  - TN
  - Karnataka
  - Maharastra

Spread in India

- Commercial cultivation from early 19th century
- Largest area in South Arcot in 1840 of Tamil Nadu
- Possible way of entry from New World, South America via Philippines or China or Java
- Ground nut oil production was from 1840 only

- Today it is cultivated and consumed as largest crop

World - Area, production and productivity (million hectares and million tonnes)

Country	Area	Production	Productivity
India	8.50	8.40	0.99
China	3.62	9.72	2.69
Nigeria	1.48	1.20	1.15
Sudan	1.09	0.81	0.74
Senegal	0.89	0.68	0.76
Ziare	0.66	0.55	0.83
USA	0.65	1.94	3.00
World	**22.89**	**31.59**	**1.38**

Oilseed scenario of the world

- Until mid 80's
  - Soybean > Cotton seed oil > groundnut
- Today
  - Soybean > Cotton seed oil > rapeseed oil > peanut > sunflower

Ground nut area, production and productivity in India (Million ha & Million t)

State	Area	Production	Productivity
Gujarat	1.99	2.38	1.20
AP	2.17	1.77	0.82
TN	1.15	1.84	1.60
Karnataka	1.21	0.95	0.79
Maharastra	0.60	0.63	1.04
All India	**8.50**	**8.40**	**0.99**

Classification

- Bunch
- Semi spreading and
- Spreading
- Also Virginia, Spanish and Valencia
- All are compatible for crossing purpose

Climate

- Adapted to wide range of climate
- However plant gets affected when
  - Low light intensity during early growth & flowering
  - Cloudy weather at flowering
- A temp range of 25-30°C
  - < 20°C and > 35°C growth gets retarded
- Once established
  - It can tolerate drought
  - Also flood for a week if drained properly

- A rainfall of 500-1000mm is fair but can produce a good crop with 300-400mm well distribution

Soil

- Well drained soil is so ideal
- Light colored loose, friable, sandy loam
- Soil with well supplied calcium and moderate amount of organic matter
- Sandy loam is more suited than clay
    - Since penetration of peg is easy and viable
- A soil pH of 6.0 to 6.5 (ranges 5 to 7)
- Saline soils are less suitable
    - since has low salt tolerance

Growth stages

Vegetative
VE – Emergence of cotyledons near the soil
V0 – Cotyledons are flat and open
V1 - First tetra foliate leaf one
Reproductive
R1 – Bloom one
R2 – Peg one
R3 – Pod one
R4 - Full pod one
R5 – Beginning seed one
R6 – Full seed one
R7 – Beginning maturity one
R8 – Harvest maturity
R9 – Over matured pod

Growing seasons

In India grown in four seasons
Kharif
85%
Rainfed
Second fortnight of June
Rabi
where winter is very mild – usually in rice fallows
Sep-Dec
Summer
II FN Dec- I Week Feb
Spring
I FN Feb – I Week Mar
In Tamil Nadu
Rainfed
Apr-May - (Pollachi, Theni, Tenkasi)
Jun-Jul - (NEZ)
Jul-Aug – Most dts
Oct – NEZ & Kanyakumari
Irrigated

Summer – All districts
Dec-Jan – All dts
Feb-Mar - New delta

Varieties in Tamil Nadu

- TMV 2 – cosmopolitan – bunch (360g)
- TMV 7 – Bunch (360g)
- TMV 10 –semi spreading (540g)
- JL 24 – Bunch - rainfed / irrigated (460g)
- VRI 2 – Spanish bunch (500g)
- VRI 3 – Bunch (350g)
- VRI 4 – Bunch (408g)
- CO 1, 2, BSR 1 – Bunch

Seeds and seed treatments

Dormancy

- Varieties differ for seed dormancy
- It is common in Virginia types
- Dormancy may go if harvest delayed
- Normally it may go off during storage

Selection of kernel is important

- Sound matured bold seeds
- Discard shriveled, broken, disease affected
- Hand decorticated is preferable

Treat with bio-fertilizers – Rhizobial cultures

- Before sowing *Trichoderma viride* @ 4g /kg

Seed management

- Selected seeds are soaked for 6 hrs with 0.5% CaCl2 solution in 50% by volume
- Spread the seeds in moist gunny bag and cover with moist gunny bag for 20-24hrs
- Seeds with viable expression of radicle is alone selected and shade dried to sowing moisture
- Unviable seeds are discarded
- Germination is ensured by 95%

Seed rate

- 140 kg for rainfed
- 125 kg for irrigated
- Increase by 10% if bold seeded (like JL 24, CO 2 & TMV 10)

Spacing

- 30 cm x 10 cm
- 15 cm x 15 cm wherever ring mosaic is prevalent

Field preparation

- Fine tilth to be obtained
- Chiseling for soil with hard pan
- Amendments for soil surface crusting
    - Lime 2t /ha along with FYM / compost
- Farm beds and channels

- 10 to 20 m-2

Sowing

- Rainfed
  - Use seed drill or gorru
  - Can also be sown behind country plough
  - Pre-monsoon sowing is also a way
- Irrigated
  - Dibbling at 4cm depth with adequate soil moisture
  - Can also be sown behind country plough
  - Irrigation may be after sowing if sown in dry soil

Nutrient management

- Rainfed
  - 10 : 10: 45 kg N, P_2O_5, K_2O / ha
- Irrigated
  - 17 : 34 : 54 kg N, P_2O_5, K_2O /ha
  - Sulphur sludge 60 kg /ha
- Gypsum to groundnut
  - 400 kg for all non calcareous soils at 40-45 DAS
  - Apply by the side and irrigate

Irrigation management

- Irrigation at 25% depletion of ASM
- IW/CPE ratio
  - 0.5 up to 40 DAS
  - 0.75 later
- Total water requirement 400-600mm
- Sowing or pre-sowing irrigation
- 20 days after sowing
- At flowering 2 irrigations
- At pegging one or two
- In pod development 2-3

Weed management

- Stirring the soil to remove weeds also aerates
  - Aeration is more essential for peg formation
- Fluchloralin 2 lit
  - pre-sowing incorporation or
  - Pre emergence application as spray
- Metalachlor 1 kg
  - Pre-emergence and hand weeding
- If no herbicide applied two hand weeding on 20 & 40 DAS

Peg formation

- No of pegs developed are higher in bunch
- Daily min temp is positively correlated
  - But maximum temp negative
- High light intensity affects pegging
- Soil moisture if goes to wilting

        - Process of peg formation stops
        - Formed pegs may dry
    - Early formed flowers may inhibit the later to form peg
    - Auxin and GA produced by pro-embryo promotes growth
    - Length of peg is generic
    - Strength of peg is a concern for management

Harvesting & Processing

- Maturity
    - Yellowing of foliage
    - Spotting of leaves
    - Dropping of leaves
    - Hardening and toughness of pods
    - Dark tannin discoloration inside the pods
    - Unwrinkled kernels and coloration of testa

Harvesting & Processing

- Delay in harvest causes 5-15% reduction
- Bunch type usually matures in about 100-105 days
- Spreading 130-150 days
- Uprooting is the way in bunch
    - Blade harrows, tractor drawn diggers
- In spreading types by digging
- Storage:
    - Plant with pods dried for two days
    - Pods separated and dried in open sun for 2-3 days
    - Proper drying of the pods may be judged by
        - Pods should give rattling sound when shaken
        - When the kernel is pressed between thumb and index finger it should split into 2 cotyledons
        - When the surface of the kernel if roughed hard a portion of the testa should come off.

Cropping systems

- Row Intercropping
    - Peanut + sorghum / ragi /redgram /chilli /cotton, sunflower /castor etc in different proportions
- Mostly mixed crop with pulses
    - Groundnut – wheat
    - Rice - groundnut
    - Rice – rice - groundnut

Economic uses

- Edible oil (50% oil)
- Haulms are palatable fodder to cattle
    - May be as hay or silage
- Groundnut kernels have high protein
    - 1.3% times higher than meat
    - 2.5 times higher than egg
    - 8 times than fruits

- Numerous industrial uses
    - Preparation veg oil (vanaspati)
    - Low quality oils for soap
    - For beauty aids, shaving cream, cols cream
    - For medical aids – plasters, ointments
    - Cake powder for laundry starch and manufacture of paper, gummed tapes and plastics
    - Activated carbon
- Oil cake - Good organic manure and cattle feed
- Cake flour is easily blends with wheat and others to bakers, confectioners, candy makers and ice cream manufactures