

OILSEEDS
GROUND NUT (MONKEY NUT, PEANUT)
Arachis hypogaea (2n = 40)
Allo tetraploid
Genomic constitution AABB

Place of origin : Brazil

Putative parents and origin of cultivated ground nut.

The cultivated ground nut is a Allotetraploid having A and B genomes. The genus *Arachis* is sub divided into 7 sections. The cultivated ground nut comes under section *Arachis*. This section includes 12 species of which *hypogaea* is the only cultivated species having 2n = 40. The other one is *A.monticola*. The rest ten species are diploids.

One view is that cultivated ground nut arose from cross *A.cardinasi* x *A.batizocoi*. But this view is not accepted by Prasad (1996). According to studies involving RFLP, PCR, isozyme have led to the conclusion.

- a) *A.hypogaea* had an allopolyploid origin.
- b) A large amount of genomic differentiation between the diploid A and B genomes occurred.
- c) Definite identification of progenitors of *A.hypogaea* has not been completed.
- d) *A.duranansis* may be the female parent
- e) *A.batizocoi* would have contributed the smallest chromosome.

Groundnut an unpredictable Crop

Ground nut is popularly known as unpredictable legume. Since the pods are borne below ground positively geotropic we cannot predict its performance before harvest as in the case of other crops. Further Ground nut is highly influenced by environment.

If there is no favorable environment yield alone will not be affected but also the quality characters. **Less boron** means low shelling % and more of immature seeds **moisture stress** leads to lower yield as well as reduction in well developed kernels. Oil percentage is also influenced by environment. **Excess moisture** leads to more vegetative growth and reduction in yield. Compared to any other crop here. G x E interaction is more pronounced.

Besides abiotic stress, biotic stress also play a major role Rust and leaf spot in diseases, red hairy caterpillar and leaf minor in pests cause major havoc.

Seed multiplication ratio is 1:5. This is also one of the bottlenecks in the spread of improved varieties.

Classification :

The genus *Arachis* is subdivided in to the following seven sections. (Gregory and Gregory, 1973)

Arachis
Erectoides
Rhizomatasae
Extranervosae
Triseminate
Ambinervosae
Caulorhizae.

1. *Arachis* **2n**
Arachis villosa 20
A. batizocoi 20
A. cardinassi 20
A. chacoense 20
A. monticola 40
A. hypogaea 40

2. *Erectoides*
A. tuberosa 20
A. paragurensis 20

3. *Rhizomatasae*
A. glabarata 40
A. hagen beckii 40

4. *Extra nervosae*
A. Villosulicarpa 20
A. marginata 20

5. *Triseminate*
A. pusilla 2n = 20

6. *Ambinervosae*
none, named

7. *Caulorhizae*
A. repens 2n = 20

In hybridization programme intersectional hybridization is not successful but intra sectional hybridization is successful keeping wild species as female is more successful.

According to Smart 1961 *A. hypogaea* has been sub divided in to two sub species

Viz. *A. hypogaea* subsp. *hypogaea*

A. hypogaea subsp *fastigiata*

According to this *hypogaea* the first two nodes bear vegetative branches then next two branches bear inflorescence

fastigiata : Inflorescence are borne on second and subsequent nodes of primary branches.

Karpavickas (1968) recognised two other botanical varieties in each of the sub species.

A.hypogaea subsp *hypogaea*
var. *hypogaeae*. *Virginia* type spreading
var *hirsuta* *hirsuta* type semi spreading.
A. hypogaea sub. sp. *fastigata*
Var. *fastigata* (Valencia type)
subsp var *vulgaris* Spanish bunch.

In India the cultivated types are grouped into

- i) bunch type Valencia
Spanish bunch
- ii) semi spreading - *Virginia* bunch
- iii) spreading - *Virginia* runner.

Breeding objectives :

Majority of area in Tamil Nadu is cultivated with bunch type and semi spreading is confined to certain pockets only. So the objectives are for bunch type.

1. Breeding high yielding bunch ground nut with dormancy suitable for dry land conditions

The dry land bunch type sown during June - July often caught up in early N.E. monsoon rains which results in germination of varieties. So it is necessary to breed varieties having dormancy. Semi spreading varieties are dormant TMV 7 slightly dormant varieties, BSR.1, ALR 2 dormant for 15 days.

2. Breeding varieties for quality

- a) **High shelling percentage** > 75%

Thin shelled varieties have high shelling percentage.

- b) **High oil content** > 50%

TMV 10 the semi spreading variety is having 52% oil. Oil content is highly influenced by environment.

ALR.2 52% oil

- c) **High sound mature kernel (SMK)**

Which is also influenced by environment. Increased boron application results in high shelling percentage and high SMK %

- d) **Table purpose varieties**

Hand picked kernel for export market. Valencia types are suitable for this.

3. Breeding disease resistance varieties.

Rust and leaf spot are causing major damage. If the onset of rust is in initial stage it results in total failure. Late leaf spot hinders harvest of crop due to foliage loss.

Tomato spotted wilt virus or Bud necrosis of late gaining importance. NCAC 17090 - resistant

4. **Breeding for pest resistant varieties**

Red hairy caterpillar, leaf miner are major pests.

5. **Breeding short duration (85 days) varieties suitable for irrigated conditions**

Chico

VR1 3 - (R33-1 x Ah selection 1) 90 days.

Breeding Methods:

1. **Introduction:**

All the ground nut lines are introduced ones. Ground nut was introduced in to Tamil Nadu by East India Company

2. **Selection:**

a) Pure line selection

TMV 2 - Selection from local Gudiyatham bunch.

b) Mass selection

JL 24 from Taiwan variety.

3. **Hybridization and Selection**

a) **Inter varietal**

Bunch x Bunch - VRI 2 (Co2 x JL 24)

SSP x Bunch - VRI 3 (R 33-1 x Ah selection)

b) **Inter specific**

For transfer of disease resistance.

Arachis sp :

A.hypogaea x *A.batzocoi*

2n = 40 ↓ 2n = 20 (Resistant)

↓
Triploid sterile

↓
doubled

↓
Hexaploid

↓

↓
Reduced to tetraploid.

A. chacoense

2n = 20

A.monticola - for thin shelled conditions

Extranervosa sp.

A.villoulicarpa for increased number of pods.

5. **Mutation breeding**

Gregory in USA extensively adopted and released varieties.

Co2 EMS from POL 1

TMV 10 Natural mutant from Argentina local.

TG 1 to TG 6 (Vikaram) from BARC Trombay.
GNLM - Gujarat Narrow Leaf Mutant.

6. Embryo rescue technique :

A.puscilla x *A.hypogaea* crosses. But not much successful. Cotyledon culture is a success.

7. Transgenic plants

Transgenic plants for disease resistance. Transfer of a particular gene from wild species thro' use of medium of carrier (plasmid) micro projectile bombardment direct transfer.

Transfer of disease resistance gene from wild species through plasmid is a success.

Ground nut varieties for Tamil Nadu

Varieties	Parentage	Duration
Bunch		
Co 1	Ah 6279 x TMV 3	105
Co 2	Mutant from POL 1	105
ALR 2	Selection from ICGV 86011	105
TMV 2	Selection from Gudiyatham bunch	105
TMV 7	Selection from Tennessee white	105
TMV 12	Selection from Uganada variety	105
POL 2	Pollachi Red x Ah 2105	105
JL 24	Selection from Taiwan variety	105
VRI 1	TMV 7 x FSB 7-2	105
VRI 2	JL 24 x Co2	105
VRI 3	J 11 x Robout 33-1	95
VRI 4	VG 5 x NCAC 17090	110
BSR 1	Selection from ICGV 86143	110
Co3	VRI 2 (VG 55 x JL 24)	105
ALR 3	(R33-1 x KG 68) x (NCA 17090 x ALR 1)	105
Semi spreading		
TMV 10	Natural mutant from Argentina	130
TMV 8	Selection from Manapparai local	135
Spreading		
TMV 3	Selection from west African variety 'Bassi'	140.