ALL INDIA COORDINATED RESEARCH PROJECT ON GROUNDNUT (AICRP-G) AT A GLANCE

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Forward

The All India Coordinated Research Project on Groundnut has a special prominence not only by the dimension of the project, but also for its important contribution to the total oilseeds productions. The crop is commercially grown in 7.6 million hectare under diverse agro-ecological situations in Rainy and Post Rainy season. Multi disciplinary research is carried out in 22 regular centers on Crop Improvement, Crop Production and Crop Protections besides conducting of nurseries, international trials, maintenance, evaluation of germplasm, genetic enhancement and finally production of considerable quantity of nucleus and breeder seed.

The AICRP-Groundnut is unique of its kind in the sense that for the first time the extenally funded projects on "Drought resistant breeding" (ACIAR-ICRISAT-ICAR) and "Aflatoxin" (UNDP) were executed through its well defined network centers. Moreover, a special project on Polythene Mulch technology (PMG) supported by the NOVOD Board were carried out enabling the project to identify special feature varieties for strategic locations and harsh environments. The most significant achievement has been identification of acid soil tolerant varieties to push the crop to new heights in N. E. Hill region. Nevertheless, Crash Programme developed by the project and supported by TMOP will help in saturating potential areas of production with quality seed of improved and popular varieties.

During the last one decade, the AICRP-Groundnut project had assumed the functioning like an institution with basic, applied and strategic research with its 61 scientists at multi-locations besides conducting routine trials and other mandatory activities. It may not be an exaggeration to state that the fruits of groundnut research, the country reaping today is the outcome of AICRP-Groundnut research, which must be nurtured further with the same dynamism and commitment.

I congratulate Dr. M.S. Basu, Director, NRCG for his sincere efforts in bringing out this compilation on "AICRPG at a Glance". I hope this compilation may be useful to all those who are concerned with the groundnut research in India.

(N.B. Singh)
Asstt. Director General
(Oilseeds & Pulses)

Contents

Introduction

Groundnut ***(Arachis hypogaea)*** is an annual legume native to South America. The Portuguese apparently took them from Brazil to West Africa and then to south-western India in the 16th century. It is now grown in most tropical, sub-tropical and warm temperate regions of the world between 40°N and 40°S latitudes. Groundnut crop is unique among all the leguminous crops and designated as "wonder legume" in that after flowering, fertilization and fruit set, the pegs (gynophore) elongate and penetrate the soil where the fruit enlarges and mature in soil.

Commercially, Groundnut is the world's fourth most important source of edible oil and third most important source of vegetable protein. The crop is grown in 24 million hectare by 84 countries producing 35 million tones of nuts-in-shell with an annual productivity of 1304 kg per hectare. In India, groundnut is annually grown mainly in 11 different states in an area of 7.6 million hectare, with a production of 7.8 million tones of pods. The average productivity of groundnut in India is about 1000 kg/ ha. Eighty per cent (6.0 million ha) of the total groundnut area is confined to five states viz., Gujarat, Andhra Pradesh, Tamil Nadu, Karnataka and Maharashtra, which account for 84% (6 million tones) of the total production. The rest of the area and production is distributed mainly in the states of Rajasthan, Uttar Pradesh, Madhya Pradesh, Orissa and Punjab

Groundnuts have traditionally been an important food legume crop for small farmers in semi-Arid tropics and urban poor in developing countries and now contribute significantly to the food supply of developed countries. In recent times large quantity of groundnut have entered world trade for oil extraction and direct edible use making it one of the major oil seed and edible seed crop of world.

The seed contains up to 29% protein and 54% oil. The oil is valued for its quality. Groundnut oil is considered as stable and nutritive as it contains right proportions of saturated fatty acid namely, Oleic acid (40-50%) and unsaturated fatty acid like linoleic acid (25-35%). The higher ratio of oleic/linoleic acid in groundnut oil, which ranges from 0.76 to 5.5 imparts stability and improves shelf life and cooking quality. In addition, a higher linoleic acid content of groundnut oil, in nutritional terms, is more desirable because of its "**hypocholosterolameic effect**" (Cholesterol scavenging). Groundnut oil also contains 0.93mg/g oil of tocopherol, an anti oxidant that prevents the oil from rancidity and increases its shelf life. It has also very high smoking point as compared to other edible oils.

More recently the use of groundnut meal is becoming more recognized, not only as a dietary supplement for children on protein-poor, cereal based diets in economically under developed countries, but also as an effective treatment for children with protein malnutrition. The nutritional value can further be improved by combining it with an animal protein such as skim milk powder or plant proteins, which can complement/supplement it. Groundnut cake (defatted meal) contains 44 to 69% of protein, which is extensively used in livestock feed concentrates and mixtures.

Raw groundnuts are excellent source of vitamins especially E, K, and B groups. Groundnut is one of the richest sources of thiamine (B_1) and contains high content of niacin. This is important as diets in dryland areas contain limited amounts of the essential amino acid tryptophan and niacin can substitute for tryptophan and spare tryptophan for protein synthesis. Roasted groundnuts are a desirable food product with a pleasant and unique flavour. The characteristic nutty flavour of roasted groundnuts largely results from the interaction between reducing sugars liberated from sucrose and free amino acids. In the International market, Indian groundnuts are highly valued for this very characteristic flavour

and aroma.

Groundnut shells are cheap source of fuel bedding material for the poultry. It also finds a place in cardboard manufacture. Recently the potentials of shells in industrial applications like enzyme production and alcohol extraction is being tried. Looking into the versatility of the crop in its uses and growing seasons, **All India Coordinated Research Project on Groundnut (AICRP-G)** with its more pragmatic and mission mode approach augments and reorients groundnut research in the country especially under dry farming situations through well established 22 net work centres located at strategic / representative environments of 11 different states thereby making this 'unpredictable legume' more predictive, productive and remunerative.

Profile of AICRP on Groundnut

All India Coordinated research Project on Oilseeds **(AICORPO)** was set up in the year 1967 with five major crops namely Groundnut, Rape seed & mustard, Sesame, Linseed and Castor. In 1972, three more crops, Safflower, Niger, and Sunflower were added. The AICORPO got a further fillip in 1977 with the elevation of the then Project coordinating unit to the status of the Directorate of Oilseeds Research **(DOR)** and services of seven Crop Coordinators were hired to plan, implement, monitor and evaluate the research programme of the respective crops. Groundnut crop Coordinator functioned from PKV, Akola.

Looking into the contribution of groundnut to the oilseeds kitty and its importance in the oilseed scenario as a whole, the groundnut was delineated from the AICORPO set up and was given a separate status of **All India Coordinated Research Project on Groundnut (AICRP-G)** during 1992 (beginning of VIII-Plan). For effective interaction with the scientists engaged in basic and strategic research at the national level, the Project Coordinating Unit was shifted from PKV, Akola to National Research Centre for Groundnut **(NRCG)**, Junagadh, Gujarat. An independent unit with separate staff, budget and infrastructure facilities were created accordingly.

The AICRP on Groundnut co-ordinates multidisciplinary research on the zonal, regional and national problems limiting production and productivity of groundnut jointly with the scientists working at state Agricultural universities **(SAUs).**

The AICRP on Groundnut has a special prominence not only by its dimension but also for its important contribution to the total oil seeds production. The crop is commercially grown under diverse agro-ecological situations in rainy and post rainy seasons. Multidisciplinary research is carried out in 22 regular centres on Crop improvement, Crop

production and Crop protection aspects of groundnut. Besides, screening of germplasm/breeding lines for diseases and pests of economic in the nurseries and conduct of International trials are also being given due emphasis.

The AICRP-Groundnut is unique of its kind with externally funded projects like 'Drought Resistance Breeding' involving Australian Centre for International Agriculture Research **(ACIAR)** -Indian Council of Agricultural Research **(ICAR)**-International Crops Research Institute for Semi Arid Tropics **(ICRISAT)**. In addition, United Nations Development Programme **(UNDP)** sponsored a special project on Promotion of groundnut as a food crop through aflatoxin management, which was executed at Anantapur (Andhra Pradesh), the largest groundnut-growing district of the world through AICRP-G, which was first of its kind for quality improvement by reducing aflatoxin risk. The out come of both the projects were very well accoladed by the review and monitoring committees there by setting up a standard for a model project for the others to follow.

Among the other significant achievements, the identification of acid soil tolerant varieties suited to hitherto untried new niches like North Eastern Hill Regions **(NEH)** opened up new vistas in introducing groundnut in the Rice Based Cropping Systems **(RBCS)** which may other wise remain fallow during the post rainy season.

Similar efforts are on to identify high / cold temperature tolerant lines to suit the February-May season of north India particularly after the harvest of Toria, potato etc. Such an effort may also help to extend the crop in Indira Ghandi Nahar Pariyojana **(IGNP)** areas of Rajasthan and North-western Uttar Pradesh to fit groundnut crop with the existing cropping system more efficiently.

Like any other field crop, use of seeds of improved varieties alone can increase the productivity of groundnut by 25-30 per cent. However,

due to inherent constraints in groundnut seed production, the improved varieties including the varieties resistant/ tolerant to Rust, Leaf spots, Bud Necrosis, Drought etc., released during the last 5-6 years did not reach to the majority of the farmers despite demand. The AICRP-G, plan, execute and monitor nucleus and breeder seed production programmes in groundnut through the well-defined network centres across the country. During the last decade (1990-91 to 2000-01) breeder seed to the tune of **46,873** q has been produced in groundnut.

To demonstrate under real farm situations, the superior productivity potential and benefit of the latest improved technologies, including new groundnut based cropping systems, high yielding varieties recommended for different regions, agro-ecological crop growing situations *vis-à-vis* traditional farming practices, Front Line Demonstrations (FLDs) are also being organized under AICRP-G. During the last decade 2550 FLDs were conducted at different AICRP-G centres.

During the last 10 years, the AICRP-G has emerged / assumed the status of an institution by virtue of its significant contributions in the areas of basic, applied and strategic researche components with the help of 61 multidisciplinary scientists at the national level besides other mandatory activities envisaged in the project.

Organisational Set Up

The All India Coordinated Research Project on Groundnut is headed by the Director, NRCG (Figure 1) who along with the Principle Investigators identified in the three main disciplines namely Crop Improvement, Crop Production and Crop Protection formulate, implement and monitor the various programmes through a team of multi disciplinary scientists located at State Agricultural Universities **(SAUs)** across the country.

The national / regional / zonal problems limiting groundnut productivity are tackled through 5 main and 15 supporting centres located in five well defined groundnut zones demarcated based on the agro-ecological conditions like rainfall, soils, diseases and pests **(Table 1)**. Besides the regular centres, couple of voluntary centres were also identified to generate required information at target sites. The five main/lead centres are located in major groundnut producing states namely Andhra Pradesh, Gujarat, Tamil Nadu, Maharashtra and Karnataka and the 17 supporting centres are distributed throughout India at strategic/hot spot locations. Manipur center is newly created during the IX- plan in the North-eastern zone to promote groundnut in the hilly terrains especially during the rabi/summer season in rice based cropping systems.

Objectives

To coordinate multidisciplinary research on the zonal, regional, and national problems limiting production and productivity of groundnut jointly with the scientists working at strategic locations/situations at State agricultural Universities (SAU's) through various agents and institutions working on groundnut.

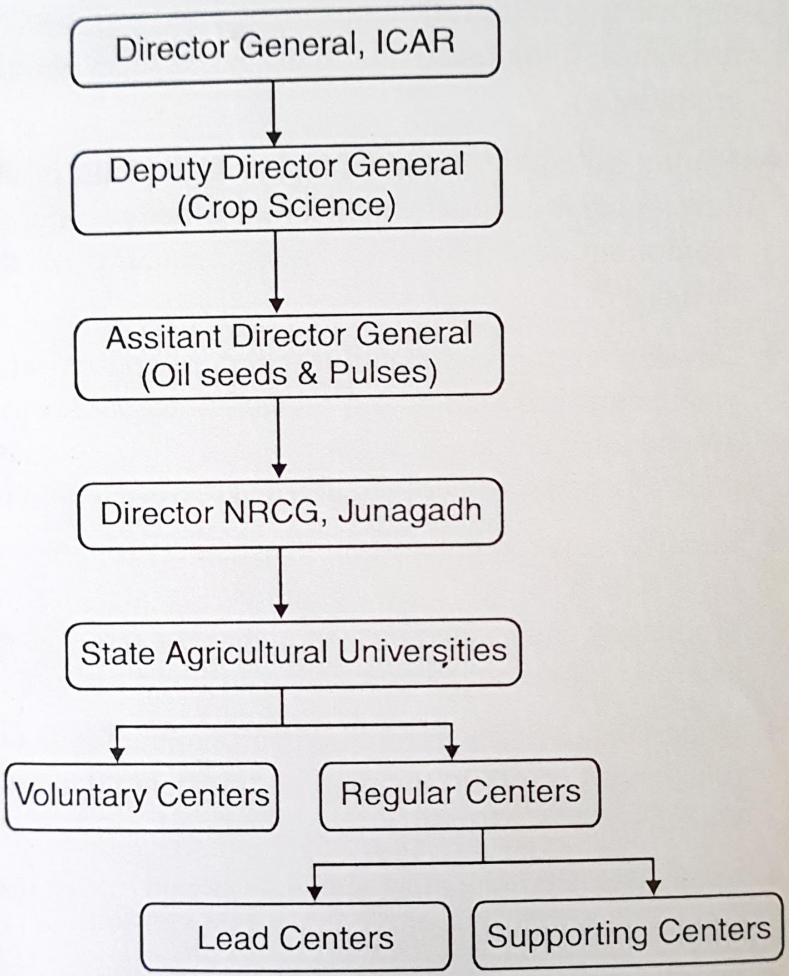
TABLE 1 : Groundnut Zones of India

Zone	Rainfall (mm)	Soil Types	Temp °(C) Min	Temp °(C) Max	Relative Humidity (%)	Crop Duration (Days)	Major Pests and Diseases
Zone I Northen Zone Rajasthan, Haryana, Punjab, Uttar Pradesh	466-478	Sandy to Sandy loam (Saline-alkaline soils in some cases)	12	38	57 - 88	120 - 150	White Grub Collar rot, Early Leaf Spot Stem rot
Zone II Western Zone Gujarat and southern Rajasthan	547-866	Medium Black (Calcareous, low soil depth)	19	35	76 - 94	115 - 130	Thrips, Jassids Leaf-miner Collar rot, Stem rot
Zone III Central Zone Northern Maharastra Madhya Pradesh	610-939	Medium Black to Loamy (Neutral soil with good depth)	16	37	65 - 90	100 - 110	Rust and Leaf-Spots, *Heliothis*
Zone IV Eastern & North Eastern Zone Bihar, West Bengal, Orissa and North Eastern Region	747-1268	Alluvium, Sandy Loam to Clay- Loam (mostly acidic)	14	34	78 - 92	110 - 120	Aphids, Thrips, Rust and Leaf-Spots
Zone V Southern Zone Southern Maharashtra, Andhra Pradesh, Karnataka, Kerala and Tamil Nadu	455-900	Red-Lateritic to Sandy-Loam (High alumina content forms, hard crusts)	15	31	68 - 95	95 - 120	Rust, Leaf spots, *Spodoptera*, Leaf miner

Mandate

- Carry out and coordinate multi-location, multi-disciplinary, time bound and action-oriented programmes in groundnut.
- Evolve superior varieties of specific regional / multi-regional importance endowed with high yield potential and built-in resistance / tolerance to major biotic and abiotic stresses in groundnut.
- Exploit potential of confectionery groundnut in the country by developing food quality nuts for sustained nutritional security and promotion of exports for better economy of the groundnut farmers.
- Develop appropriate location specific, economical, eco-friendly, viable agro-production and protection technologies to maximise groundnut yield and returns per unit area, time and investment under diverse agro-ecological crop growing situations.
- Identify most remunerative and efficient cropping systems suited to different areas and situations for stepping up the area, production and productivity of groundnut in sole, sequential, inter and relay cropping systems under varying situations.
- Undertake on-farm researches in groundnut for demonstrating the realizable potentials of improved technologies under real farm situations in specific areas of cultivation.
- Exchange, maintenance, evaluation and utilization of genetic resources in groundnut.
- Undertake nucleus and breeder seed production programmes in groundnut.

Fig. 1 Organizational Set up of AICRP on Groundnut



Salient Research Accomplishments

A. Crop Improvement

i) Germplasm Enhancement

A total number of 9296 of germplasm lines have been collected and maintained. Besides wild germplasm, several advanced generation breeding lines having specific breeding values have also been identified. Sharing of germplasm / breeding lines among coordinating centres has been a regular activity which has paid rich dividends. This has resulted in the development of several high yielding varieties like **GG 5, GG 7 (Gujarat), AK 159 (Maharastra)** and **HNG 10 (Rajasthan).**

ii) Utilisation of wild Arachis genetic resources

A large number cross combinations involving different varieties of *Arachis hypogaea* as pistillate parents and several accessions of diploid wild species of the section *Arachis* (*A. villosa, A. cardenasii A. helodes, A. correntina, A.kempfmercodoi, A. duranensis* and *A. stenosperma*) as pollen parents were also effected to develop disease/insect resistance genotypes apart from broadening the genetic base. Several advanced generation, potential breeding populations with resistance / tolerance to major pests and diseases have been developed.

In addition, a perennial forage groundnut of interspecific origin was also developed at Regional Research Station, Vridhachalam Tamil Nadu. The crop could be cut for green fodder in about 90 days after planting and the subsequent harvest could be made at 45 days interval. In each cut, green fodder yield was to the tune of 12 tons/ha. From 7-8 cuttings a total quantity of 80-85 tons/ha/year could be harvested (Back Cover).

iii) Varietal release

Several new varieties with inbuilt resistance/ tolerance to major insect pests and diseases, varieties suitable for acid, saline soils and high water use and partitioning efficiency have been evolved suiting to the diverse agro-ecological situations in both rainfed Kharif and Rabi/summer seasons. In addition, several nitch specific special feature varieties have also been developed. The list of varieties developed and released are provided in **Table 2.1 to 2.4**

Table 2.1 Varieties for regional and multi-regional importance

Situation	Recommended Varieties
A.Kharif rainfed	
High yielding and early maturing Spanish bunch varieties	DRG 17, K 134, DRG 12, BSR 1, VRI 2, VRI 3, VRI 4, Co 4, AK 159, GG7, TG 37A
High yielding and early maturing Virginia varieties	CSMG 884, CSMG 84-1, HNG 10, LGN 2, GG 14,ICGS 76
b. Rabi/summer	ICGS 44, OG 52-1, TG 26, GG 2,TAG 24, R 8808, R 9251, Dh 86
c. Paddy fallow residual moisture situations	RSHY 1, VRI 3, Dh 40, BSR 1, Dh 86
d. For rice based cropping systems (RBCS) in NE states	TG 26, R 8806, Dh 40, Dh 86
e. For spring situations in Punjab and U.P	ICGS 1, SG 84

Table 2.2 Varieties resistant/ tolerant to biotic stresses

Stress	Recommended Varieties
Field tolerance to PBND under Rabi/ Summer situation	ICGS 11, ICGS 44, R8808, CSMG 884
Resistant to Rust and LLS	ALR 1, ALR 2, ALR 3, Girnar 1, ICG (FDRS) 10, ICGV 86590, R 8808
Nematode tolerance (Kalahasti malady)	Tirupati 2
Pests resistance	Girnar 1 (Jassids), Kadiri 3 and GG 2 (Spodoptera)

Table 2.3 Varieties resistant/ tolerant to abiotic stresses

Stress	Recommended Varieties
Fresh Seed dormancy	TG 17 (30 days), TG 26 (12-15 days), VRI 1 (7 days), BSR 1 (21 days), Dh 40 (30 days)
Tolerant to acid soils	TG 3, TG 22
Tolerant to salt affected soils	TG 26, TG 32
High water use and partitioning efficient varieties	TAG 24, Somnath, ICGS 37, CSMG 84-1, CSMG 884, TAG 24, K 134

2.4 Special Feature Varieties

Features	Recommended Varieties
Large seeded, Confectionery varieties with reduced aflatoxin risk for export promotion	BAU 13, B 95, Somnath, TKG 19A, GG 20 TG 41
High harvest index (about 50%)	TAG 24, TG 26, GG 2

B. Cost effective agro production technologies

New breeding lines / entries with specific attributes need agronomic research to maximize the exploitation of their potentials. Hence, agronomic research has been given a new thrust to identify eco-friendly, economically viable, low cost production technologies to maximize the yield potentials of groundnut under different cropping systems. The technologies developed in respect of each category along with the Cost and Benefit ratio realized are listed in **Table 3**.

C. Eco- friendly Crop protection technologies

The AICRP on Groundnut through the multidisciplinary team approach carried out strategic researches on pests and diseases of economic importance limiting groundnut productivity in different regions and developed several eco-friendly and sustainable crop protection technologies for effective control and management of these diseases and pests of economic importance which include

- Identification of several sources of resistance to major diseases and pests of economic importance such as Rust, LLS, PBND, Stem rot, collar rot, *Spodoptera,* Leaf miner and Jassids affecting groundnut through multilocational screening at hot spot locations
- Intercropping of groundnut + bajra (3:1) and 1 spray of neem seed cake extract (5%) was found to be effective in controlling LLS and rust
- Soil application of *Trichoderma viride* @ 25 kg/ ha + Soil application of castor or neem cake @ 1000kg/ha was found effective against stem and collar rots at Hanumangarh, Kadiri, Raichur and Vridhachalam
- Deep ploughing during summer season had a positive effect on

Table.3 Eco-Friendly, Economically Viable and Sustainable Agro Production Technologies Developed

Sr. No.	Technology	Component / Application	Recommend Area / State	ICBR
1.	Intercropping	Groundnut + Red gram (6:1) / 4:1	Maharastra	2.28 to 4.50
		Groundnut + Soybean (6:2)	-Do-	
		Groundnut + Sunflower (6:2) / 3:1)	-Do-	
		Groundnut + Castor (3:1)	Gujarat	
		Groundnut + Sunflower (3:1) / 2: 1	-Do-	
		Groundnut + Red gram (3:1)	-Do-	
		Groundnut + Black gram (4:1)	Tamil Nadu	
		Groundnut + Green gram (2:1)	-Do-	
		Groundnut + Chilli (2:2)	Karnataka	
		Groundnut + Sunflower (3:1)	-Do-	
		Groundnut + Red gram (4:1)	-Do-	
2	Weed Management	Pre-sowing application of Fluchloralin @ 1.0 a.i/ha + 2 hand weeding	All India	1.20-2.10
		Pre emergence spray of Butachlor @ 1.25 kg a.i / ha + 2 hand weeding	Gujarat, Maharastra Karnataka, Tamil Nadu	
		Pre emergence application of Metolachlor @ 1 lt a.i/ha + 3 hand weeding		
3	Yield maximization / stabilization a) Pre monsoon sowing	Advancement of sowing by about 15 days before the regular onset of monsoon.	Gujarat, Tamil Nadu	6.94

Sr. No.	Technology	Component / Application	Recommend Area / State	ICBR
	b) Life saving/ protective irrigation	One or two protective irrigation(s) at critical stages i.e. Peg penetration and Pod development maturity	In rainfed production System of Gujarat, Rajasthan and Punjab	1.94
	c) Planting Geometry	Broad Bed and Furrow (BBF) and Cris Cross method of planting increased yield between 18-20% over the conventional sowing.	For Red Soil areas of A.P. T.N. and medium black soil of Maharashtra	4.67
	d) Polythene mulch	Provide faster germination and growth under low temperature situation, conserve moisture, check pests and disease incidence, arrest weed growth, increase photosynthetic efficiency and improve partitioning resulting in very high productivity (50-100%).	Low temp. areas and rabi residual moisture and summer/spring irrigated situations of Eastern, North Eastern, Orissa, Costal A. P., M. S. and Punjab	4.50

Sr. No.	Technology	Component / Application	Recommend Area / State	ICBR
	e) Rhizobium	Rhizobium strains namely IGR 6, IGR 40 and TNAU 14 improve groundnut yield in Rice fallow situation.	Rice Fallow situations	1.28
	f) Micronutrient management	Soil application of ZnSO4 @ 10 kg/ha followed by foliar application (0.2%) in Zinc deficient soil was highly remunerative. Incorporation of Borax in the soil @ 2.5-5.0 kg/ha in boron deficient tracts to avoid hollow heart formation.	Micro nutrient (Zn) deficient soils. Boron deficient soils	1.89

management of stem and collar rot

- The lady bird beetle *Coccinella septum puncatata* was found to be an efficient predator of aphids/jassids
- Application of *Bacillus thurungiensis* (0.5 g/lit) and Quinolphos 25 EC were most effective in controlling *Spodoptera litura*
- A plant product Margocide O.K. 0.08% alone or in combination with Monocrotophos 0.05% has given better results in reducing the sucking pests (Aphids/jassids)
- Early sowing at Vrridhachalam and Junagadh (Middle of June and 1st week of July) reduced the incidence of leaf miner and *Spodoptera*
- Inter cropping of groundnut with castor (4:1), soybean (11:1) and cowpea (11:1) reduced the incidence and damage by *Spodoptera,* thrips and leaf miner by 10-15%

D. Linkages of AICRP-Groundnut with National and International organizations for research and transfer of technology

The All India Coordinated research project on groundnut has strong linkages with various national and international organizations working on this crop. The existing linkages with various institutions in specific areas of research are mentioned below

Table 4. Linkages of AICRP-Groundnut with National and International organizations

Programme	Organizations
A. International	
1. Germplasm management	ICRISAT
2. Studies on water use efficiency	ACIAR-ICRISAT-ICAR
3. Aflatoxin management	UNDP
4. Capacity building	IFAD
B. National	
1. Germplasm maintenance	NBPGR
2. Cropping system research	Directorate of Cropping Systems Research, Modipuram
3. Quality characteristics	BARC Mumbai, NDDB Anand, CFTRI Mysore
4. Breeder seed production	State seed Corporations, State Agricultural departments, SAUs, Growers federations, NSC, SFCI
5. Plant Quarantine	Plant Quarantine Departments, SAUs, Govt.of India
6. Marketing and Export	IOPEA Mumbai, APEDA New Delhi
C. Transfer of Technology	
1. International confectionery groundnut varietal trial	KVK, Mundra, (Gujarat)
2. Polythene Mulch Groundnut	NOVOD board, IPCL/Reliance at strategic locations
3 a. Evaluation and multiplication of improved groundnut varieties.	KVK, Sindri, Dhanbad (Bihar), KVK,
b. Testing of package of practices	Holy Cross, Hazaribagh (Bihar)
4 a. Cropping system / sequence based research	KVK, Ramkrishna Mission Ashram,
b. Seed multiplication	Ranchi (Bihar)
5. Evaluation and promotion of groundnut varieties under Rabi / Summer irrigated situations	KVK, Kalyan, Purulia (West Bengal)

Programme	Organizations
6.Evaluation and seed multiplication of improved groundnut varieties	KVK, HFC, Durgapur (West Bengal)
7.Groundnut based cropping system research under upland situation	KVK, Sonamukhi, Bankura (West Bengal)
8.Evaluation of varieties and upland and acid soil condition / rice fallow minimal irrigation situation	KVK, Seva Bharati, Kapgadi (West Bengal)
9.Evaluation of improved groundnut varieties under rice fallow / residual moisture situations.	Ramkrishna Ashram, Nimpith (West Bengal), KVK, ICAR Complex, Goa

E. Priorities and future thrust areas

- Development of varieties tolerance to drought/moisture stress (early season / mid season and end of season) using emperical and physiological traits
- Development of varieties resistant to diseases of economic importance like rust, Leaf spots and *Alteraria*, Peanut Bud necrosis, Peanut stem necrosis, and insect pests like Leaf miner, *Spodoptera, Heliothis* and thrips
- Incorporation of earliness especially in Virginia Runner groundnut, which is of longer duration
- Development of varieties for rain fed acid soils in general and upland paddy soils in particular
- Development of confectionery groundnut varieties with reduced aflatoxin risk for direct consumption and value addition
- Development of groundnut varieties for rabbi/Summer, spring, rabi-residual moisture/paddy fallow situations with i) earliness (85-95 days) ii) fresh seed dormancy (15-30 days) and iii) tolerance to cold / acid soils
- Development of suitable production packages for residual soil moisture situation
- Development of integrated nutrient management packages for groundnut based cropping systems
- Development, assessment and refinement of IPM modules for target diseases and pests in groundnut
- Breeding varieties responsive to high and low input management Conditions
- Strengthening multi-disciplinary research for developing agro-production and protection technologies for new areas and refinement of those technologies already developed for increasing production.

Vision

- Development of a profitable and less risks prone, sustainable and most suitable groundnut based cropping system for rain fed eco-system
- Double the productivity in irrigated eco-system and exploiting new horizons in the assured residual moisture situations of rabi/ summer in non-traditional areas to mop up sizable production
- Exploiting the strength of groundnut as a food crop for alleviating protein energy mal nutrition (PEM) in the country and to embank upon the high potential world market in Confectionery/ HPS groundnut trade