Crop Diversification Through Intercropping of Groundnut

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Cover photo : Groundnut field showing intercropping

Message

Income from an unit area of sole groundnut is low due to low average productivity which hovers around 1000 kg/ha. During rainy season, the area under groundnut is decreasing in northern states and, in the rest of the country, it remains stagnated due to erratic monsoon pattern and consequent uncertainty in returns. However, intercropping groundnut with other crops offers a more economic returns to the farmers from a unit area of land.

The authors have made a good effort in putting together the scattered information on intercropping with groundnut. I hope under the changing cropping patterns, the information in this bulletin will be useful to the end-users in stabilising production and increasing returns per unit area, particularly, under dry-land conditions.

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1. Intercropping

With ever increasing human population, the domestic demand of edible oil in India may exceed 20 million tonnes by 2020. Obviously, groundnut, the premier oilseed crop in the country, hs to play a pivotal role in achieving this target. Meeting the increased demand will be a stupendous task since horizontal increase in area is not possible due to over-pressure on land from food crops and urbanization. In this situation, crop diversification through intercropping of groundnut offers a great scope to increase groundnut area by growing in many traditional and non-traditional cropping systems. It has been estimated that by adopting intercropping system, an additional area, equivalent to 25% of the current groundnut area, can be brought under groundnut crop.

One of the sub-sets of groundnut-based cropping systems is intercropping. Growing groundnut as a base / component crop depends on the duration of companion crop and traditional farmers' practice of a particular area. The guiding principle of intercropping system is that this system not only saves the crop against vagaries of pest and disease and adverse climatic conditions but also helps in better utilization of farm and natural resources (solar radiation, nutrient, soil moisture etc.), which, in turn, increase total crop production and monitory returns per unit area.

Of late, the concept of intercropping has witnessed a sea change. It makes use of scientific approach to maximize a system's productivity. Despite increasing research attention during recent years, intercropping system is still poorly understood compared with the sole crop. However, with the availability of new high yielding, short duration varieties of cereals, pulses and oilseeds with different types of canopy architecture, it is now possible to design suitable intercropping combinations with groundnut to give substantial yield advantage over sole crop at low cost. Some of the intercropping systems practiced in important groundnut growing areas are given in Table 1. The most yield contributing factor for high yield from intercropping over sole cropping is the improved use of environmental resources. A common advantage of intercropping over sole crop is that the component crops may root at different depth and thus utilize resources more efficiently. This effect will be especially advantageous when moisture is the most limiting factor for production. Thus, the

Table 1 : Groundnut based intercropping systems in various states / regions in India

State/Region	Intercropping System	Ratio of base groundnut to intercrops
(1)	(2)	(3)
1. Andhra Pradesh		
Telangana	Groundnut + Redgram	6:1
	Groundnut + Pearlmillet	3:1
	Groundnut + Cowpea	6:1
Rayalseema	Groundnut + Castor	5:1
	Groundnut + Greengram	6:1
	Groundnut + Redgram	5:1
2. Bihar	Groundnut + Maize	6:1
	Groundnut + Sesame	4:1
3. Gujarat		
Saurashtra region	Groundnut + Sesame	1:1 or 3:1
	Groundnut + Sunflower	1:1 or 3:1
	Groundnut + Cotton	1:1
Rajkot	Groundnut + Castor	3:1
	Groundnut + Redgram	5:1
4. Haryana	Groundnut + Pearlmillet	3:1
5. Karnataka	Groundnut + Redgram	4:1
	Groundnut + Cotton	3:1
	Groundnut + Sunflower	4:2
	Groundnut + Ragi/Sorghum	6:1
6. Kerala	Groundnut + Casava	Dibbled on both sides of ridges
	Groundnut + Banana	
7. Maharashtra	Groundnut + Sorghum	4:1
	Groundnut + Redgram	6:1
8. Madhya Pradesh		
Rewa region	Groundnut + Redgram	8:2 or 10:2
	Groundnut + Soybean	4:1 or 6:1
	Groundnut + Sesame	4:1
9. Rajasthan	Groundnut + Pearlmillet	4:1
	Groundnut + Sesame	4:1
10. Tamil Nadu	Groundnut + Cotton	5:1
	Groundnut + Blackgram / greengram	6:1
	Groundnut + Castor	7:1
	Groundnut + Sesame	6:1 rainfed
	Groundnut + Pearlmillet / Sorghum	4:1 or 6:1 irrigated

State/Region	Intercropping System	Ratio of base groundnut to intercrops
(1)	(2)	(3)
11. Uttar Pradesh	Groundnut + Pearlmillet	4:1
	Groundnut + Sesame	4:1
	Groundnut + Greengram	4:1
	Groundnut + Redgram	6:1
12. Orissa	Groundnut + Paddy (upland)	1:3
	Groundnut + Fingermillet	1:2
13. West Bengal	Groundnut + Paddy (upland)	1:3
14. NEH Regions	Groundnut + Maize	3 : 1
	Groundnut + Sunflower	3:1

componentarity crops compliment each other in utilizing the resources. The intercropping offers two types of complementarity as discussed below.

(a) Temporal Complementarity

This is related to utilization of time. Temporal complementarity occurs when component crops make their major demand on resources at different periods during the season. This kind of complementarity is particularly evident when groundnut is intercropped with long duration crop such as cotton, castor, pigeon pea and cassava. With cotton or castor, relatively high investment cash crops, groundnut is commonly a supplementary crop grown with little or no sacrifice of the cotton or castor. In contrast, groundnut is usually a more important crop in the groundnut + pigeonpea combination where groundnut with reasonably full stand is sown with only occassional rows or plants of pigeonpea. In this system, the fast growing crop ensures good use of early resources and the slow growing crop ensures good use of later resources. High yields are therefore, expected by the simple process of complete resource utilization over time.

(b) Spatial Complementarity

This is related to utilization of both, time and space resources. The common example is groundnut + cereal combination where there is little differences between the maturity period of component crops. In this combination, groundnut with several rows is intercropped between only occasional rows of a cereal. The increase in yield in this system is partly due to interception of more light but mainly due to more efficient conversion of light. The erect C_4 cereal leaves make efficient use of the high light intensity at the top of the canopy whereas the compact C_3 groundnut leaves make efficient use of the low light intensity at the bottom of the canopy. Therefore, shading by cereal improves overall light use efficiency by reducing light saturation in the groundnut.

2. Intercropping with short duration annuals

(a) Sunflower

Sunflower is generally cultivated in pure stand in the dry tracts of the country. It is well adapted to a wide range of environmental conditions because of its thermo and photo-insentive nature. Groundnut, a long duration crop vis-a-vis sunflower, can be grown along with the latter so that the early season rains benefit sunflower and the late rains benefit groundnut, thereby giving some assurance to the dry lands farmers. The aggressive growth habit of sunflower and its allelopathic effect on groundnut is obvious and reduction of groundnut yield to the extent of 19-33% has been reported mainly because of shading effect. However, advancing the sowing of groundnut by 15-30 days prior to sunflower reduces the competition to some extent. This will result both the crops maturing at the same time. Under simultaneous sowing of both the crops, short statured and early maturing sunflower varieties may reduce the competition. Research data indicated that a net returns of Rs. 10,120 and 12,615 per hectare could be obtained under sunflower groundnut intercropping system in Saurashtra region of Gujarat and West Bengal, respectively. (Fig 1)

(b) Sesame

Sesame is a short duration oilseed crop, therefore, yield reduction in groundnut due to sesame intercropping is very less. This intercropping is more advantageous in moisture deficit rainfed conditions. The optimum row ratio is 1-4: 1 for groundnut and sesame.

This system is very much profitable while tested in Junagadh and West Bengal and net returns to the tune of Rs. 9947-12292 per ha could be obtained (Fig.2).

(c) Pearl millet

This combination is very common in red soils of the semi-arid tract of India. Resource utilization is of particular interest in this combination. In this

combination, groundnut experiences about the same degree of competition as in sole cropping. In contrast, pearl millet experiences much less competition in intercropping than in sole cropping. The higher combined yield is expected due to increase in efficiency in converting light energy into dry matter through evenly distributed two-tier canopy system (C_4 crop in the upper canopy layer and C_3 crop in the lower canopy over a greater surface area of leaf). The proportion of the water used by the crop in this combination is also higher than sole crop. Under stress condition, intercropping is less efficient in converting light energy into dry matter. Thus, when moisture is limiting, the efficiency of light energy may be less important factor in determining the yield advantage of this particular crop combination. Pearl millet is intercropped in the row ratio of 1:1 with Virginia groundnut and 1:2 with Spanish groundnut (Fig 3).

(d) Sorghum

In India groundnut is very commonly intercropped with sorghum in the dry tract of Andhra Pradesh, Maharashtra, Madhya Pradesh and Karnataka, if rain commences at normal time. The optimum row ratio in this intercropping system is 1: 1 with Virginia groundnut and 1:2 with Spanish groundnut.

In this combination, sorghum depresses the yield of groundnut by about 50%. Despite reduction in groundnut yield, overall benefit may be expected when yield of both the crops are considered together. Two rows of sorghum with eight rows of groundnut is one of the best combinations providing 38-53% yield advantage over sole crops. This system could provide net returns to the tune of Rs. 3000/ha at Hyderabad and at Indore (Fig 4).

(e) Maize

Groundnut is very commonly intercropped with maize in M.P. and Bihar. General observation is that maize also depresses groundnut yield in intercropping system. Yield of groundnut is one third to half of the yield obtained from the sole crop but maize yield is not reduced. However, yield advantage of 20-60% can be obtained in combination with maize + groundnut due to marked differences in maturity period in two components. Yield of groundnut may be higher when it is sown 4 weeks earlier than maize as compared to the traditional practice of sowing of both the crops at the same time (Fig 5).

(f) Rice

In the rainfed, coastal upland belt of Orissa and lateritic tract of West Bengal, when sole crop rice virtually fails, intercropping of rice with groundnut provides a overall yield advantage to the tune of 12% and may be attributed to the symbiotic association of legumes with non-legumes. Generally, groundnut is intercropped with rice in the row ratio of 1:3.

(g) Finger millet

In Orissa, under moisture stress condition, intercropping of groundnut with finger millet is profitable, although the full advantage of intercropping may not be utilized owing to overlapping of growth and maturity of the two crops.

(h) Chilli

In the Sundarban area of West Bengal (coastal saline tract) and Dharwad region of Karnataka yield advantage is quite high when 3 rows of groundnut is alternated with 3 rows of chillies.

3. Intercropping with Long Duration Annuals

(a) Pigeonpea (red gram)

Among the legumes, pigeonpea + groundnut is the most prevalent intercropping system in India. Even if rains are delayed this combination is promising since groundnut makes rapid canopy coverage of the ground, and uses the resources more efficiently. A general observation is that groundnut is able to tolerate low light levels but it is more susceptible to pigeonpea competition. Pigeonpea rows are grown 135 cm apart with 5-6 closely spaced rows of groundnut in between. In this combination intercrop yield averages 82% of groundnut and 85% of pigeonpea i.e. 67% total yield advantage could be obtained. This system is reported to give higher returns than intercropping of groundnut with other pulses viz. black gram, green gram and cowpea. In Chotanagpur and Santhal Parganas district of Bihar where groundnut is relatively a new introduction, groundnut + pigeonpea in 3:1 ratio is found successful. At Jalgaon (Maharashtra), this system provided net returns upto Rs. 22,338/ha. (Fig. 6)

(b) Cotton

Raising 2-3 rows of groundnut in between cotton rows spaced 2 m apart is reported to give higher income than raising either of them alone. Here, cotton yield is not affected and yield of groundnut is additional to the cotton yield. (Fig. 7)

(c) Castor

Castor intercropped with groundnut is better than growing castor alone. This system provided net returns of about Rs. 10,000/ha at Junagadh and at Kanpur. Castor, a long duration oilseed crop, being slow growing in initial stages and planted in wider row provides both space and time for raising groundnut. (Fig. 8)

(d) Sugarcane

This system is prevalent in the state of Maharashtra. Groundnut + sugarcane intercropping is not much encouragable since it depresses cane yield of both planted and ratoon cane. The pod yield of groundnut is also very low (Fig 9).

4. Intercropping with Perennial/Plantation Crop at Early Stages

(a) Cassava

Introducing an additional crop like groundnut between the traditionally wide spaced cassava plantation increases the production efficiency of cassava planted land, and conserves soil moisture and fertility (additional nitrogen from nitrogen fixation), apart from doubling the net income compared with the sole cassava planting. However, when early sown groundnut is intercropped with late planted cassava, the yield of groundnut is not seriously affected but the yield of cassava is reduced to less than one fifth of sole crop. This intercropping could give yield advantage of 33-55%. In Trivendrum and Orissa 12 q/ha of groundnut, in addition to fully yield of tapioca, is obtained.

(b) Banana

Growing groundnut between wide spaced rows of Banana is common practice in Tamil Nadu, Maharashtra and parts of Gujarat. (Fig.10). Groundnut is dibbled on both sides of edges of banana plantation.

(c) Coconut

This is very common in Kerala. This system follows the principle of multistoried cropping system where crops of different height grow together. Since coconut plant has no side branching and requires pruning, shading effect on groundnut is very negligible (Fig 11).

5. Management Practices in Intercropping

(a) Plant Population and Geometry

The yield advantage of the intercropping system depends on the plant population of the component crops and geometry of the cropping system. Plant population indicates the number of plants / unit area while geometry considers proportion of area allotted to each component crop. Ratio of base groundnut to different intercrops practiced in different parts of the country is given in table 1. Irrespective of the cropping systems and seasons, the paired-row provides more space for intercropping without any reduction in yield.

Groundnut can be grown by border method (planting seed regularly in 3 rows while leaving every 4th row vacant) without reduction in pod yield. Pearl millet as intercrop with groundnut performs better in this method due to its early removal and less shading effect. This method is promising from saving of fertilizer and seed (by 25%) point of view.

In general, paired-row and skip-row planting of sole sunflower crop reduces yield of sunflower. However, inclusion of groundnut as an intercrop increases the total oilseed production in paired and skip-row planting of sunflower. It is better to have plant population in the ratio of 67:33 in groundnut + sunflower intercropping to maintain the individual plant performance.

Paired-row of groundnut with Paired-Row of Chilli (2:2) also performs better than normal planting.

In groundnut + pigeonpea intercropping system, maintaining 100% of recommended plant populations in groundnut along with 75% plant population of pigeon pea was found optimum in Tamil Nadu, Karnataka, Maharashtra and Gujarat, while at Khargone (MP), maintaining plant population of 75% in groundnut and 50% in pigeon pea was found optimum. In groundnut + cluster bean intercropping at Durgapura (Rajasthan), groundnut with 75% plant population and cluster bean with 100% population was considered optimum for realizing higher returns.

(b) Genotype

As in sole cropping, groundnut performance in intercropping could be improved by identification of suitable genotypes. The potential for genotype improvement could be high in intercropping because of possible interaction with associated crops. Therefore, in case of groundnut crop growing with a more dominant associated crop, there may be particular need for identification and selection of genotypes of both the crops grown in association because genotype performance in intercropping may not be very closely related to genotype performance in sole cropping.

Not much information is available on suitable genotype for groundnut based intercropping systems. Results indicate that with increasing groundnut maturity, and the associated change from bunch to runner habit, the groundnut contribution (groundnut land equivalent ratio) in inter cropping tends to increase. However, combined effect of both crops (Total Land Equivalent Ratio) is not affected in case of four genotypes (M 13, TMV 2, Robut 33-1 and MK 374) although the latest maturing groundnut M 13 is associated with the highest mean value of total Land Equivalent Ratio. The result also indicated that increased groundnut contribution (Groundnut Land Equivalent Ratio) with reduced sorghum duration is of the same order for all groundnut genotypes.

Experimental results at NRCG indicated that groundnut cultivar M 13 was well suited to Pigeonpea, cv BDN 2 and medium durations, tall stature castor cultivar, DCS 9. Also, groundnut genotype GAUG 10 along with sunflower MSFH 17 was found well suited for intercropping. Suitable cultivars for some of the groundnut based intercropping systems prevalent in different states have also been identified under the All India Coordinated Research Project on Groundnut (Table 2).

(c) Time of Planting

- Under rain fed conditions, it is desirable to plant crops at earliest opportunity to allow maximum growth during the most favourable periods. In general, all the component crops may be planted simultaneously to achieve higher yields.
- Staggered planting of component crops is found to be advantageous to safe guard drought against uncertain rainfall regimes to utilize late season rain

Table 2 : Recommended varieties for component crops in important intercropping system

State/Region	Intercropping System	Varieties of the component crops	
		Groundnut	Intercrop
A.P.			
Rayalseema	Groundnut + Pigeonpea	K 134	LRG 41
Jagtial	Groundnut + Pigeonpea	TG 26	LRG 41
Gujarat	Groundnut + Pigeonpea	M 13 / GG 20	BDN 2
	Groundnut + Castor		
	Rainfed	GAUG 10 / GG 20	DCS 9 / DCS 32
	Irrigated	GAUG 10 / GG 20	GCH 5
	Groundnut + Sunflower		
	Rainfed	GAUG 10 / GG 20	Morden
	Irrigated	GAUG 10 / GG 20	MSFH 8, MSFH 17
	Groundnut + Sesame	GAUG 10 / GG 20	Gujarat Til 1
Karnataka	Groundnut + Sunflower		
	Rainfed	Dh 3-30	Morden
	Irrigated	Dh 3-30	APSH 11, PSFH 67
	Groundnut + Pigeon pea	JL 24	ICP 8863
M.P.	Groundnut + Maize	Phule Pragati	JM 8
	Groundnut + Pigeon pea	JGN 3	UPAS 20
Maharahstra			
Jalgaon	Groundnut + Pigeon pea	Phule Pragati	ICPL 87
Rahuri	Groundnut + Pigeon pea	TG 26	BSMR 736
	Groundnut + Sunflower		
	Rainfed	Phule Pragati	Morden
	Irrigated	TG 26	MSFH 8, MSFH 17

fall and also to reduce competition between the component crops. Staggered planting of pigeonpea, castor, sesame and sunflower (30 days after groundnut sowing) with groundnut has been recommended for Saurashtra region of Gujarat. This practice allows operation of bullock drawn implements for intercultivation in groundnut. However, staggered planting has limited application in semi-arid tropics because rainfall is uncertain in rain fed areas. Besides, the opportunity to establish a second component crop is risky; it is very difficult to establish a second component crop with mechanical equipment in an established crop.

- Simultaneous sowing is common practice in intercropping of cereals (pearlmillet, sorghum and maize), sesame and short duration pulses (green gram and blackgram) with groundnut.
- In case of cotton +groundnut, planting of groundnut is done 25-30 days after cotton sowing.

(d) Nutrient Management

In recent years, there has been an emphasis on working out the nutrient requirements on cropping system basis rather than based on individual crop but not much results and recommendations are available. Since the associated crops are invariably of differential nature in growth and nutrient needs, thus the understanding of the system as a whole is difficult. Some results collected from scattered literature are presented below.

- The cereal + groundnut intercropping is very common in India. Intercropping groundnut with sorghum, millet, maize reduces nodule weight, nitrogenase activity and biological nitrogen fixation. Two possible explanations for such effect are : i) inhibition of N2 fixation by the nitrogen fertilizer applied to the cereal; ii) adverse shading effect due to tall cereal canopy. This reduction in the N_2 fixation suggest that groundnut intercropped with cereal is almost a partial crop and so can not be expected to fix or leave in the soil as much nitrogen as a full sole crop.
- When groundnut is intercropped with cereals, benefit, if any is likely to be on the following crops. Therefore, to get benefit within the groundnut cereal intercropping, an additional dose to the extent of 50% (10-15 Kg N-P/ha) of groundnut in addition to the normal dose of fertilizer to cereal is needed. To

get the direct benefit to a companion crop, another possibility is that if the non-legume (cereal) intercrop is grown at a lower plant population than a sole crop there may be a nitrogen benefit because the groundnut is less competitive for soil nitrogen, and, hence the non-legume intercrop may be able to obtain more nitrogen per plant than as a sole crop. Thus, groundnut intercrop may still indirectly improve the nitrogen status of a non-legume companion crop even where it does not make any fixed nitrogen available. Therefore, in this system half of the nitrogen of cereal component should be applied besides full doses of phosphorus and potassium.

- Application of one third of nitrogen as basal and remaining in three equal splits either as soil application or foliar spray to pearlmillet gave the maximum yield and monetary returns in groundnut+pearlmillet intercropping in Junagadh (Gujarat).
- In groundnut + pigeon pea, 50% of recommended dose of fertilizers for both component crops gave the maximum productivity of the system in Junagadh (Gujarat), while in Chintamani (Karnataka) application of DAP @ 50 kg/ha along with rhizobium and phosphorus solubilising micro-organisms (PSM) gave the maximum yield and monetary returns of the system. In groundnut +castor, it is better to apply fertilizers in proportion to plant density of the component crop. If plant density of groundnut is 75%, then apply fertilizer only3/4th of the recommended fertilizers.
- In groundnut + sunflower, maximum net returns were obtained when 100% recommended fertilizer dose for groundnut and sunflower were applied. At Latur on a medium black soil, application of full-recommended dose of phosphorus for groundnut and full-recommended dose of fertilizers to sunflower recorded maximum yield and monetary returns.
- Method of fertilizer application is important when component crops have different requirement as with nitrogen in cereals+groundnut intercropping. In this case, nitrogen should be applied to cereal component as far away from the groundnut as possible so that nitrogen fixation of groundnut is not affected. Foliar application of nitrogen to cereal component may be advantageous in these conditions.
- Phosphorus should be band placed as far as possible to all the crops in the system. The potassium, if necessary to apply are better broadcast over the entire area before planting and incorporated with the soil.

(e) Weed management

It has been generally accepted that intercrops are better than either of the sole crops in competing with the weeds. However, mechanical weeding may be difficult or even impossible in certain spatial arrangements of intercrops or when the row spacing of the component crops are too close to each other. While applying herbicides for weed control in intercropping, care for selectivity of the herbicide must be taken.

In case of staggered planting of pigeonpea, castor, sesame or sunflower with groundnut, weeds can be controlled in groundnut by interculturing or hand weeding since planting of intercrop is done 30 days after groundnut sowing. Mechanical weeding may not be possible in simultaneous planting. In that case, weeds can be controlled through hand and mechanical weeding. Pre emergence application of Pendimethalin @ 1-1.5 kg ai /ha followed by one hand weeding at about 25-30 days may control the weeds effectively in groundnut+sunflower, and groundnut+pigeonpea intercropping systems. In groundnut+castor, application of Fluchloralin @ 1.5 kg/ha as pre sowing soil incorporation may control weeds effectively.

(f) Insect pest and disease management

In groundnut, various insect pests and diseases cause heavy loss in yield. Among them, thrips, jassids, leaf miner, early and late leaf spot, rust and bud necrosis are considered as the major limiting factors in the production of groundnut. Intercropping leads to a change in the micro-climate of the canopy and thus influences the succession and population build up of pests. In intercropping with certain combinations of component crop, management of insect-pests and diseases is more efficient but in certain combinations the situation may be aggravated.

- Late leaf spot was minimum in groundnut+cowpea followed by groundnut+pearlmillet and groundnut+blackgram.
- Incidence of rust was minimum in groundnut+sorghum intercropping. Intercropping of groundnut+cotton reduces the incidence of stem rot. Intercropping of pearlmillet with groundnut helps to minimize the incidence of peanut bud necrosis disease.

- In root knot nematode affected areas, intercropping groundnut with cereals namely, pearlmillet, sorghum, maize and rice will help to reduce the nematode problem.
- However, where peanut mottle virus is a problem, intercropping of groundnut+ cowpea may be avoided. On the other hand, recently it has been found that intercropping of sunflower with groundnut may enhance spread of peanut stem necrosis disease caused by tobacco streak virus. Thus, an integrated approach including need-based fungicides should be adopted to manage diseases in groundnut based intercropping system.
- Intercropping of groundnut with cereals, especially maize and pearlmillet, reduces incidence of pests by 10% in groundnut. In groundnut+pearlmillet, lowering of incidence by 21% of leaf miner was observed. Intercropping of crops like, cowpea, soybean and castor attract leaf miner and jassids if not controlled properly. In groundnut+castor, population of Spodoptera may increase. In groundnut+sunflower intercropping system, high damage (35.%) by *Spodoptera litura* was noticed as compared to sole crop of groundnut (23%).

(g) Harvesting, threshing and storage

In intercropping systems, mechanical harvesting of both the crops by bullock or tractor drawn implements may not be some time possible because of different row ratios of component crops. Therefore, groundnut harvesting is done by hand uprooting. After harvest of groundnut crop, harvesting of intercrop may be done as per method adopted for sole cropping of component crop. When both the component crops are of similar duration, care should be taken to avoid crop mixture at the time of harvesting as well as during threshing. Threshing is done separately for groundnut and component crops. Produce of groundnut as well as component crops should be stored as per normal procedure.

Fig. 1 Groundnut + Sunglower intercropping system

Fig. 2 Intercropping of groundnut with sesame

Fig. 3 Intercropping of groundnut with pearl millet

Fig. 4 Intercropping of groundnut with sorghum

Fig. 5 Intercropping of groundnut with maize

Fig. 6 Intercropping of groundnut with pigeon pea

Fig. 7 Intercropping of groundnut with cotton

Fig. 8 Intercropping of groundnut with castor

Fig. 9 Intercropping of groundnut with sugarcane

Fig. 10 Intercropping of groundnut with banana

Fig. 11 Intercropping of groundnut with coconut