

Traditional farmer practices on pest Incidence, and production of groundnut cultivars in Sathankulam and Radhapuram Taluks of Tamil Nadu

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ABSTRACT

Groundnut is a cash crop cultivated in many parts of Tamil Nadu and its production is governed by pest and disease problems, as well as cultivation practices. Smallholder farmers are often unfamiliar with many modern cultivation practices. Hence, we undertook an effort to understand the cultivation practices used for pest and disease incidence and the cost-benefit ratio of groundnut in the southern districts of Tamil Nadu. For this survey, we have selected seven farmers from Sathankulam Taluk in Thoothukudi and three from Radhapuram Taluk in Tirunelveli district. Observation reveals that each village has its own pest management practice. Manure rate, seed rate, weeding practices, etc. However, all farmers in a locality have invariably used the same synthetic/chemical pesticides. In general, the cost-benefit ratio ranged from 1:1.5 to 1:2.0. This ratio is consistent with the national cost-benefit ratio for groundnut. The study can be extended to other villages where groundnut cultivation is being practised.

Keywords: Manure rate, seed rate, weeding practices, pest management, cost-benefit ratio.

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INTRODUCTION

Groundnuts (*Arachis hypogaea* L.) belong to the family Fabaceae and the subfamily Papilionaceae. They are commonly known as the poor man's almond, poor man's wonder nut, or peanut. It is an important food crop, frequently used for edible oil and as a rich source of vegetable protein. It is the 6th most important oilseed crop in the world (Singh *et al.*, 2020; Ravi *et al.*, 2024). It is the world's third-largest source of vegetable protein and the fourth-largest source of edible oil. Due to its protein-rich composition, groundnut, when fortified with cereals, has played a crucial role in mitigating protein-energy malnutrition, thus driving its increasing cultivation (Singh and Kumar, 2020). Groundnut seeds are a rich source of oil (35–56%), protein (25–30%), carbohydrates (9.5–19.0%), minerals (P, Ca, Mg, and K), and vitamins (E, K, and B) (Gulluoglu *et al.*, 2016). Peanut production plays a crucial role in global food security, particularly in developing countries, where it provides essential nutrition and income (Gelaye *et al.*, 2024). Being a prominent oilseed, food and pasture crop, and

leguminous crop with significant economic and nutritional benefits, offering a promising option for local farmers (Jamir *et al.*, 2024). It is widely grown in tropical, subtropical, and warm temperate climates. Groundnut occupies an area of 25.2 mHa, with worldwide production of 35.9 Mt. Globally, groundnut production for the 2023-2024 period was estimated at 49.5 million metric tonnes (USDA 2024), with a production of 1648 kg per hectare. In India, about 48.80 lakh hectares were reported under groundnut during 2023-24, and the production was estimated at 102.89 lakh tonnes. Notable Groundnut varieties cultivated across India include Kadiri-2, Kadiri-6, BG-1, BG-2, Kuber, GAUG-1, GAUG-10, PG-1, Chitra, and Amber, while in Andhra Pradesh, prominent varieties are Kadiri-6 (K6), Narayani, Lepakshi, TG-47 and Dharani. India has exported 6.807 million tons of groundnuts to the world (ANGRAU Groundnut Outlook Report 2023-2024).

India contributed nearly 19% to global groundnut production and ranks first in area (6.09 mHa), with a yield of 10.21 million tonnes

at a productivity of 16.76 q/ha (Anon, 2023). In India, the states of Gujarat, Andhra Pradesh, Telangana, Tamil Nadu, Karnataka, and Maharashtra account for 80% of groundnut area and 84% of production. (Anon, 2023). It is an important commercial crop in rain-fed areas, contributing about 40 per cent of the country's total oilseed production. India occupies first position in both area (70%) and production (75%), with production concentrated in the four states of Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka. Andhra Pradesh, Tamil Nadu, Karnataka, and Orissa have irrigated areas that account for about 6% of India's total groundnut area. With the liberalisation process under the WTO regime and the availability of cheaper oil from non-conventional sources such as rice-bran, palm oil, cottonseed, and soyabean oil, the share of groundnut in edible oil fell from 54% in 1974-75 to 14% in 1999-2000 (Hegde, 2005).

Arul Prasad (2019) reported on groundnut crop productivity and classified regions in Tamil Nadu based on the groundnut productivity index between 2010 and 2015. Based on his analysis, Thiruvallur, Kancheepuram, Cuddalore, Dindigul, Karur, Villupuram, Thanjavur, and Thiruvarur are in the high productivity zone. Ariyalur, Ramanathapuram, Salem, Tiruppur, Sivaganga, The Nilgiris and Virudhunagar are in the low productivity zone, and Krishnagar, Coimbatore, Perambalur, Dharmapuri, Kanniyakumari, Madurai, Thoothukudi, Namakkal, Pudukkottai, Salem, Erode, Theni, Trichirappalli, Tirunelveli, Tiruvannamalai, Vellore, Villupuram and Karur are in the moderate productivity zone. High productivity is achieved due to climatic factors, soil type, improved crop management, and the introduction of high-yielding varieties (Ravi *et al.*, 2024). In Tamil Nadu, groundnut is grown in almost all districts, mainly in Thoothukudi and Tirunelveli. Production has been influenced by cultivation practices (Sahayaraj and Muthukumar, 2009), pest and disease incidence (Sahayaraj and Paulraj, 2003; Sahayaraj and Raju, 2003) and market value of the produce.

Given the increasing importance of groundnut cultivation in the state, and to provide data-driven suggestions for increased productivity

and sustainability, we felt the need for a detailed investigation to determine groundnut yields and pest and disease management in selected areas within each district. The current investigation is centred on studying the incidence of pests and diseases, management practices, growth and yield, and the cost-benefit ratio of groundnut.

MATERIALS AND METHODS

Study area

Seven farmers from Sattankulam taluk of Tuticorin (Ganaiyarkudiyerupu, Velayuthapuram, TanjaiNagaram and Alangkinaruvillages) and three farmers from Radhapuram taluk (Pazhavor, Aavaraikulam and Levanchipuramvillages), were selected randomly for the study. The following information was collected from the farmers during the survey for our study purpose: Area under cultivation (in acres), Groundnut variety used, Manure/fertiliser used, Name and rate of application of pesticides, Pest incidence (60,75,90 Days after the Seedling Emergence-DASE), Disease incidence (60,75,90 DASE), and cost of Production.

Collection method

The population of the most abundant pests and natural enemies were counted from 10 randomly selected areas (1 x 1 m) from each farmer's field at 60, 75 and 90 days respectively, after the seedling emergence (DASE). Direct observation, hand-picking, and net-sweeping methods were used. Ten sweeps were performed in each area to collect Coleoptera, Hemiptera, Odonata, Orthoptera and Lepidopteran insects. Collected insects were kept in the insect trap bottle, transported to the laboratory, and sorted by insect order. In the direct observation and hand-picking method, the population of insects and diseases in all crop samples were counted and recorded. This method is commonly used in groundnut for the population determination of coccinellids, dragonflies, damselflies, and reduviids, and these were recorded on a per-plant basis.

Data Analysis

Insect population data were collected on 60, 75, and 90 Days; cumulative mean and SE values were calculated and presented separately for each village.

RESULTS AND DISCUSSION

Farmer and farm details

Most of the farmers are middle-aged (42 to 60) (90%), and a few are more than 60 years old (10%). All of them are traditional farmers and follow routine cultural and management practices. The land size ranges between 1 and 4 Acres. The soil type is Red and black in colour, seen in selected areas, Sathankulam and Radhapuram taluks, respectively.

Cultivation practices

Groundnut is a major oilseed crop in India. The crop is cultivated on 45% of India's total oilseed area and accounts for 56% of the country's oilseed production (Wightman and Rao, 1993). In Tamil Nadu, groundnut is raised in about 10.3% of the total cropping area. Generally, in Radhapuram and Tirunelveli taluks, 500 Ha and 14,000 Ha of land have been utilised for

from the Tamil Nadu Government Agriculture office, Palayamkottai, and from the agriculture office, Radha Puram). It has been cultivated in a system of rows and columns with 30 × 10 cm spacing between rows and within rows.

Variety used

Most of the farmers from Sattankulam/Sathankulam taluk (42.85%) used the bunch type of cultivation, Thanseyal type (28.57%), and JL (25%). JL 24, also known as PhulePragati, is an early-maturing type with dark green leaves that was developed at Jalgaon and released for commercial cultivation in 1978 for Maharashtra and Gujarat, but it has adapted across the country (Reddy, 1988). JL 24 is much preferred because of its bold seed. However, Radhapuram taluk farmers practised TMV-7 (66.66%) more than VRI -2 (33.33%). VRT - 2 is a high-yielding, early-maturing Spanish bunch variety

groundnut cultivation (information collected

Table 1. Details of groundnut cultivation in three villages from Radhapuram taluk, Tirunelveli district, Tamil Nadu.

Parameters	Avarikulam	Pazhavur	Levanchipuram
Cultivable area (acres)	Three	One	Two
Variety used	TMV- 7	TMV- 7	VRI - 2
Seed rate (Kg/Ac)	74	92.5	111
Manure used	Cow dung, Gypsum	Cow dung, Gypsum	Cow dung, Complex
Incidence of Diseases	Nematode infection	Leaf curl diseases Nematode infection	Leaf curl diseases
Age of the crop (in days)	106	105	104

Selection from 'Argentina variety' at Raichur yielded a Spanish bunch variety 'KRG-1'. It was released for commercial cultivation in 1981 for the North Karnataka region. It is also suitable for the summer season (Reddy, 1988). TMV-2' is a mass selection from 'Gudhiatham bunch' developed at Tindivanam and released by the government of Ex-Madras state during 1936. It was released for cultivation in Tamil Nadu in 1936, but is now grown in Andhra Pradesh and Karnataka as well; it is a widely adapted variety with attractive seeds. It has been a very popular variety among farmers for decades. It is widely popular for its distinct taste, which is lacking in other varieties. JL24 has been considered a promising and high-yielding variety in Andhra

Pradesh (Hussian *et al.*, 2009). During Kharif, production ranged from 1500 to 1800 kg/ha. However, in Tamil Nadu, the farmer gained 1096-1371 kg/ha at Sattankulam taluk. It was reported previously that JL24 is a resistant variety against Spodoptera and thrips) (Gowda *et al.*, 2002). TMV-7 and VRI-2 are highly resistant varieties to abiotic factors and even to industrial effluents (Sundaramoorthy *et al.*, 2001). The farmers gained from 1188-1371kg/ha of Radhapuram taluk.

Manure used

Almost all the farmers used cow dung as the first manure, followed by urea, complex, and gypsum (Tables 1 and 3). The manuring rate ranges from 900 to 1200 kg/Ac. However, the production and

pest incidence data indicate that manure does not influence pest incidence or groundnut production. During 2001, in Andhra Pradesh. Singh and Hussain (2001) evaluated the impact of gypsum application on groundnut yield. They demonstrated that gypsum application increases pod yield compared with the control. In our study, gypsum application in Aavariakulam increased groundnut production (1279.46kg/ha) compared to Levanchipuram (1370.85kg/ha). Soil, being the natural medium for plant growth, is comprised of mineral matter. To exploit these minerals, sufficient manure is applied to the soil, which provides an adequate physical condition that favours biological changes and, naturally, changes the soil's chemical composition favourably. Along with these changes, soil structure will improve, and the amounts of humus, beneficial microorganisms, and earthworms will increase, ultimately improving soil fertility.

Seed rate

Seed is the basic input in agriculture. The seed rate was varied from 74 to 111 kg/Acre. Seed of improved varieties is a costly input; more so in the case of groundnut, where the non-availability of improved variety seed is a major constraint in most of the groundnut-growing countries. Seed treatment has not been followed by any of the farmers in the study area.

Pesticides used

In Sattankulam taluk, 80% of the farmers used monochrotophos, either twice (60%) or thrice (40%). Without knowing the extent of pesticide use, a farmer used 810 pesticide powders for pest management (Table 1). In Radhapuram taluk, most farmers used Monochrotophos (thrice) more than Metacide and Ecolux (Table 3). This may be because farmers do not know which chemicals can be used for pest or disease management. There are a number of ancillary control measures, such as village- or watershed-based decisions on the advisability of pesticide application and the optimal sowing time to avoid pest attacks. During the first 50 days after seedling emergence (DAE), if defoliation exceeds 25%, or if one or more larvae per plant are found, then apply Endosultan @ 350 mL a.i.

ha-1, Monocrotophos @ 300 mL a.i. ha-1 or T/Fenvalerate @ 100 mL a.i. ha-1 drastically reduces defoliator populations and their incidence. Insecticide resistance has been detected in *Spodoptera* and *Helicoverpa* species. Farmers should be prepared to apply insecticide if pheromone trap catches exceed 100 moths per right, averaged over a week, or if there are more than 1 – 2 *Spodoptera* egg masses per meter of crop row (7 – 12 plants). Note that the crop can withstand considerable levels of defoliation after seeds begin developing in the pod without a significant reduction in yield.

Disease Incidence

In both districts, leaf curl disease was more predominant (55.55%) than the nematode problem (22.22%). Farmers have not distinguished between pest and disease infestation and microbial infection (diseases) of groundnut.

Pest Incidence

Most groundnut insect pests are sporadic in occurrence/distribution. In general, insects cause 10-20 % crop loss, although many insect species are sporadic in nature (Sahayaraj and Raju, 2003). Application of Monocrotophos 36% EC reduced the groundnut pest population and increased the pod production (2840kg/ha) (Raman *et al.*). The following insects were common in the groundnut fields of both taluks. The incidence of *S. litura* ranged from 0.13 to 0.23 and from 0.07 to 0.51 pests/plant in Radhapuram and Sathankulam taluks, respectively. *Amsacta albistriga* was recorded in both districts.

Wightman and Rao (1993) described that the blind ant, *Dorylus orientalis* Westwood (Formicidae: Hymenoptera), attack was severe on crops sown during December – April, and its damage on pods ranged between 1.82% in crops sown in the first week of May and 30.21% in crops sown during the first fortnight of February, while pods were completely free from ant damage when sown during other periods. An isolated groundnut crop at the ICRISAT center in Hyderabad was completely destroyed during the post-rainy season of 1989 (Wightman and Ranga Rao, 1993).

Table 2. Farming details of groundnut cultivation in Sathankulam taluk, Thoothukudi district, Tamil Nadu

Details	GK1	Gk2	GK3	V1	V2	T	A
Name of the village	Gnaniyar Kudiyerupu			Velyauthapuram		Tanjai Nagaram	Aalangkinaru
Cultivable area (acres)	2	4	3	1	1	2.5	1
Variety Used	Bunch type		Seyal type		Bunch type	J.L.24	J.L.24
Manure Used	Cow dung, Urea, complex	Complex, Urea	Cow dung, Urea	Cow dung, Complex	Cow dung, Complex		
Crop Age (days)	100					102	
Seed rate (Kg/Ac)	92.5	74		111		89	1111
Incidence of Diseases	Leaf curl diseases			No Disease	No Disease	-	-

In northern India, blind ants swarm at the end of the cold season in late February, but swarming also occurs in April. Sridhar and Mahto (2000) reported that groundnut CV. ICGS-1 was attacked by up to 37 insect and mite pests across different orders, along with 6 natural enemies. Two soil-inhabiting pests that cause significant damage to the crop and maturing pods were identified as the oriental army ant, *Dorylus orientalis* (Westwood). We recorded all the ant populations as black ants. Its population was high in both Gnaniyar Kudiyerupu and Alangkinari (Table 5). However, we did not record ants from any of the villages in Tirunelveli district (Table 6).

Pest Population – Order-wise

Lepidopteran adult population ranged from 1.2 to 1.43 and 1.46 to 2.0 Sathankulam and Radhapuram taluk, respectively (Table 5). Low pesticide application might be the reason for the low Lepidopteran population in Sathankulam taluk. Results also reveal that the *S. litura* larval population was also high in Sathankulam taluk (Table 5). Ground-dwelling black ants' population was recorded in Alanguneri (7.6 per m³) of Sathankulam taluk. We have not recorded black ants in the Radhapuram taluk. Hemipteran insects, including Phyllorhidae and Miridae, were recorded. Among coleopteran insects, we

recorded stem weevils, ground dwellers, and pod borers. They create a large hole in the kernel, rendering it unfit for human consumption and oil extraction.

The maximum coleopteran population was recorded in Gnaniyar Kudiyerupu (Table 5), followed by Aalangkinaru and Pazhavur. In Pazhavur, the coleopteran population was higher during 60 days after seedling emergence (DASE) than in other localities. Its population was not recorded during 60 and 75 DASE in Velyauthapuram. Grasshoppers are devastating pests in groundnut; they feed on foliage, flowers, and flower buds. Its total population was higher in Aalangkinaru than in Gnaniyar Kudiyerupu and Levanchipuram. Grasshopper population was not recorded in Velayethapuram until 75 DASE and throughout the study period in Tanjai Nagaram (Table 5). Grasshoppers are the major defoliators of groundnut, and their management is essential. However, none of the farmers took any specific measures to manage grasshoppers.

Natural enemies

Under natural conditions, we recorded natural enemies from Reduviidae (e.g., *Rhynocoris fuscipes* and *Sastrapoda elongata*), Araneae, Coleoptera, and Odonata in groundnut ecosystems. In the groundnut ecosystem, we recorded odonates; values ranged from 1.13 to

2.3 per mm³ in Sathankulam taluk (Table 5). In Tiruneveli district, the Odonata population was roughly equal across all villages (Table 6). This natural enemy of groundnut mainly feeds on small flying insects, such as aphids and whiteflies

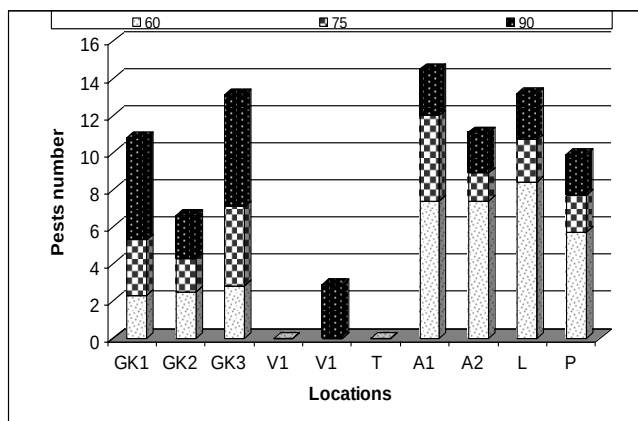


Figure 1. Population levels of Coleopteran pests in the study area of Sathankulam and Radhapuram taluks of Thoothukudi and Tiruneveli districts of Tamil Nadu during 60, 75, and 90 days after seedling emergence. GK1 – Gnaiyar Kudiyerupu; GK2 – Gnaiyar Kudiyerupu; GK3 – Gnaiyar Kudiyerupu; V1 – Velyauthapuram; V2 – Velayethapuram; T – Tanjai Nagaram; A1 – Aalangkinaru; A2 – Avarikulam; P – Pazhavur; L – Levanchipuram

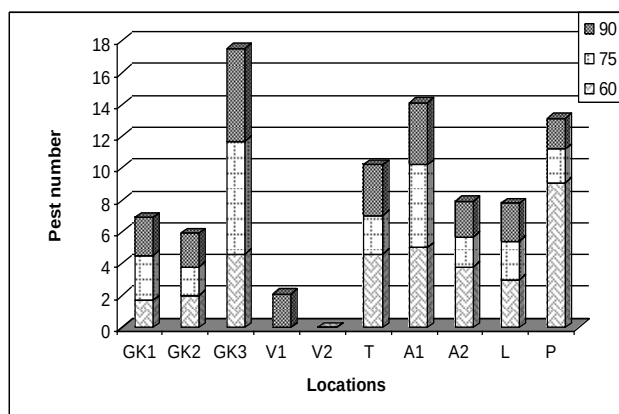


Figure 2. Population level of grasshoppers in the study area of Sathankulam and Radhapuram taluks of Thoothukudi and Tiruneveli districts of Tamil Nadu during 60, 75 and 90 days after the seedling emergence. GK1 – Gnaiyar Kudiyerupu; GK2 –

Gnaniyar Kudiyerupu; GK3 – Gnaniyar Kudiyerupu; **Reduviidae**

Reduviidae are the largest and most economically important predatory heteropteran insects, distributed worldwide. They are considered generalist predators that prey on insects from the orders Coleoptera, Hemiptera, Orthoptera, Isoptera, Blattaria, etc. In groundnut, the distribution of reduviids was studied by Sahayaraj and Paulraj (2003) and Sahayaraj and Raju (2004). It was mainly recorded from Gnaniyarkudiyerupu (3.5 reduviids per mm³) (Table 5). The role of reduviids in groundnut pest populations has been studied and is available in the literature either alone (Sahayaraj, 1994, 1996, 2002; Sahayaraj et al., 2002) or in combination with other integrated pest management (IPM) components, such as botanicals (Sahayaraj and Ravi, 2007). **Spiders** Pests and natural enemies, including the spider population, were recorded in groundnut by Sahayaraj and Paulraj (2003). Spider populations were recorded across all study areas, but they varied from village to village. For instance, its population was highest in Pazhavur (2.93 spiders per mm³) and lowest in Tanjai Nararam in the Sathankulam district (Table 5). Previously, Sahayaraj and Paulraj (2003) recorded a maximum of 3.71 spiders. Later, it was reported that the spider is an important biocontrol agent in groundnut ecosystems and its population can be studied in the near future (Sahayaraj and Jeya Parvathi, 2010).

Coccinellid population

Its population was regulated by the aphid population. The population of coccinellids was also crop stage-dependent. For instance, at GnaniyarKudiyerupu and TanjaiNagaram, during 60 DASE, the coccinellid population was not recorded (Table 5). We have not recorded the coccinellid population in other localities (Table 6).

Beneficial insects

In addition to natural enemies, we recorded hymenopteran insects, honey bees, and Lepidoptera as non-insect pests in our study areas. Since the population was small and sporadic, we have not recorded it. All insects are involved in cross-pollination.

Table 5. Incidence of arthropods (pests/ natural enemies) recorded from Sathankulam taluk, Thoothukudi district, Tamil Nadu

Insect order/ insect	GK1	Gk2	GK3	V1	V2	T	A
Lepidoptera	1.33±0.13 ^d (0-3)	1.3±0.17 ^e (0-3)	1.3±0.22 ^h (1-4)	1.43±0.18 ^d (0-4)	1.2±0.16 ^d (0-3)	1.16±0.12 ^e (0-3)	1.36±0.16 ^f (0-3)
Black ants	4.96±0.37 ^b (0-12)	7.43±0.51^a (1-12)	6.2±0.43^a (2-11)	4.16±0.61 ^b (3-12)	6.7±0.55^a (0-13)	5.13±0.51 ^a (0-12)	7.6±0.54^a (2-15)
Hemiptera	6.1±0.38^a (1-12)	6.73±0.59 ^b (1-12)	3.7±0.47 ^e (0-11)	7.13±0.72 ^a (0-8)	2.43±0.40 ^b (0-8)	2.46±0.31 ^c (0-7)	2.6±0.38 ^d (0-8)
Coleoptera	2.3±0.19 ^c (0-5)	1.96±0.24 ^d (0-5)	5.46±0.49 ^b (1-13)	0.7±0.18 ^g (1-4)	-	-	4.83±0.56^b (0-13)
Orthoptera	4.06±0.46 ^c (0-13)	2.2±0.30 ^c (0-7)	4.4±0.39 ^c (2-11)	-	0.9±0.29 ^f (0-6)	3.3±0.35 ^b (0-8)	4.7±0.39 ^c (1-9)
<i>Spodoptera litura</i>	0.15±0.01 ^e (0-3)	0.51±0.06 ^h (0-8)	0.39±0.04 ^d (0-6)	0.16±0.02 ^f (0-5)	0.16±0.02 ^e (0-4)	0.07±0.01 ^h	0.11±0.02 ^h (0-4)
Natural enemies							
Spiders	-	-	-	1.0±0.31 ^e (0-7)	0.4±0.17 ^g (0-4)	-	-
Coccinellids	-	0.83±0.14 ^g (0-2)	-	-	-	0.9±0.22 ^g (1-5)	1.86±0.36 ^e (0-7)
Reduviid	-	-	3.5±0.39 ^f (2-9)	-	-	1.1±0.13 ^f (1-3)	-
Odonata	1.33±0.15 ^d (0-3)	1.26±0.17 ^f (0-3)	2.3±0.29 ^g (0-6)	1.7±0.20 ^c (0-5)	1.3±0.19 ^c 90-4	1.53±0.19 ^d (0-4)	1.13±0.16 ^g (0-3)

Value in Parenthesis indicates range; Same alphabets in a row indicate significance at 5% level; GK1 – Gnaniyar Kudiyerupu; GK2– Gnaniyar Kudiyerupu; GK3– Gnaniyar Kudiyerupu; V1–Velyauthapuram; V2–Velyauthapuram; T– Tanjai Nagaram; A – Aalangkinaru

Table 6. Incidence of arthropods (pests/natural enemies) recorded from Radhapuram taluk, Tirunelveli district, Tamil Nadu

Insect order/ Insects	Avarikulam	Pazhavur	Levanchipuram
Lepidoptera	1.5±0.24 (0-5) ^f	2.0±0.27 (0-5) ^e	1.4±24 (0-5) ^f
Hemiptera	0.6±0.31 (0-5) ^g	4.96±0.70 (0-15) ^a	1.8±0.31(0-7) ^e
Orthoptera	3.2 ±0.64 (0-11) ^a	4.36±0.71 (0-13) ^b	3.33±0.53 (0-12) ^a
Coleoptera	2.63±0.42(0-10) ^b	2.6±0.34 (0-14)	2.1±0.26 (0-5) ^b
<i>Spodoptera litura</i>	2.16±0.34 (0-7) ^c	3.5±0.57(0-14) ^c	2.1±0.26 (0-5) ^b
Natural enemies			
Spiders	1.73±0.31(0-6) ^d	2.93±0.46(0-9) ^d	1.9±0.36 (0-8) ^c
Odonata	1.46±0.22 (0-4) ^e	1.6±0.26(0-5) ^f	1.6±0.23 (0-4) ^d

Values in parentheses indicate range. Same alphabets in a row indicate significance at 5% level

Cost-Benefit Ratio (CBR)

Groundnut is susceptible to a number of pests and diseases that can cause considerable yield losses. Recommended protection measures against diseases and insect pests should be regularly followed during the cropping season. The major input cost components in groundnut cultivation in India are seed and labour. Seed is the major input cost, accounting

for 60.4 to 75.0% and 32.5 to 39.9% in Sathankulam and Rahadapuram taluks, respectively. Human labour ranks second in the cost structure, accounting for 22-38% and 20-24% in the Sathankulam and Rahadapuram taluks, respectively. Groundnut cannot compete effectively with weeds, particularly at the early stages of development (3-6 weeks after sowing).

Table 2. Cost-benefit ratio of groundnut (CBR) cultivation in Sathankulam taluk, Thoothukudi district, Tamil Nadu

Parameters	GK1	Gk2	GK3	V1	V2	T	A
Seed cost	3746	3124	2997	4495	4495	3608	4495
Weeding	625	1250	1250	1250	1250	800	1250
Wages for Seed Preparation	125	87.5	200	200	200	120	200
Manure	1200	1200	900	900	900	750	900
Seedling plantation	1150	575	1200	1200	1200	140	1200
Pesticide	150	100	-	-	-	140	300
Pesticide application	160	240	-	-	-	160	240
Harvesting	1800	1500	2100	2100	2100	1800	1800
Total gain	15625	15625	16250	16750	18750	15000	18750
Transporting charge	375	375	390	390		360	450
Total cost for cultivation	9331	8752	8292	10535		7878	10835
Cost Benefit Ratio (CBR)	1:1.67	1:1.78	1:1.95	1:1.54	1:1.76	1:1.90	1:1.73

GK1 – Gnaniyar Kudiyerupu; GK2-- Gnaniyar Kudiyerupu; GK3-- Gnaniyar Kudiyerupu; V1 – Velyauthapuram; V2- Velyauthapuram; T- Tanjai Nagaram; A – Aalangkinaru

Early removal of weeds reduces this competition. Crop rotation may reduce certain weed species. The crop should be thoroughly weeded within the first 45 days. Once hanging begins, soil disturbance should be avoided or kept to a minimum to prevent interference with the developing pods. Instead, weeds at this stage can be controlled by hand-pulling. For weeding purposes, farmers spent Rs. 625 to Rs. 1250 per Acre. This excess variation among the villages might be due to a lack of manpower. The CBR ranged between 1:1.54 and 1:1.95 in Sathankulam (Table 2) and 1: 1.46 and 1: 1.89 in Rhedapuram taluk (Table 4). Further research is necessary to refine these recommendations and develop a more sustainable and regionally adaptable groundnut cultivation strategy in selected areas.

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