

RED GRAM SUBSECTOR

A STUDY IN KADAPA



Conducted by APMAS as part of the initiatives of
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APMAS

Mahila Abhivruddhi Society, Andhra Pradesh
No: 20, Rao & Raju Colony, Road No.2, Banjara Hills,
Hyderabad-500 034
Phone: +91-40-23547927/32, 23555864
Fax: + 91-40-23547926
E-mail: cbox@apmas.org website: www.apmas.org

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THE DLRC KADAPA

District Livelihoods Resource Centre Kadapa was established on 7th July 2005 as an institution to support livelihoods needs in the district. It is located in the premises of the Technical Training Development Center (TTDC). This is managed under collaborative initiative of Mahila Abhivruddhi Society, Andhra Pradesh (APMAS), Aga Khan Foundation (AKF), District Watershed Management Agency (DWMA), Commissioner Rural Development (CRD) and Andhra Pradesh Rural Livelihoods Programme (APRLP).

Since then the DLRC has been offering various services which includes capacity building to the secondary stakeholders related to various projects such as APRLP Watershed programme and NRM programmes implemented by District Water Management Agency (DWMA).

The DLRC also undertakes studies on predominant livelihoods activities practiced in the district with a view to understanding and assessing the scope for livelihoods enhancement for poor and marginalized who are dependent on the activity. Towards realizing this objective study on red gram and small ruminants were initiated by the institution.

BRIEF PROFILE OF KADAPA

The Kadapa District is surrounded by Kurnool District on the north, Chittoor District on the South, Nellore District on the East and Ananthapur District on the West. Total Geographical area is 15,379 Sq. Kms. It is divided into 3 Revenue Divisions consisting of 51 mandals 831 Gram Panchayats 965 Revenue Villages and 4533 Habitations. As per the 2001 Census (Provisional) the population is 2601797 of which the Rural 2014044 and the Urban 587753. The density of population in the District is 169/Sq.K.M.

The Soils are of two types, i.e., Red Ferruginous and Black Soils. Black Clay is the most superior soil occupies 23.7% area in the district.

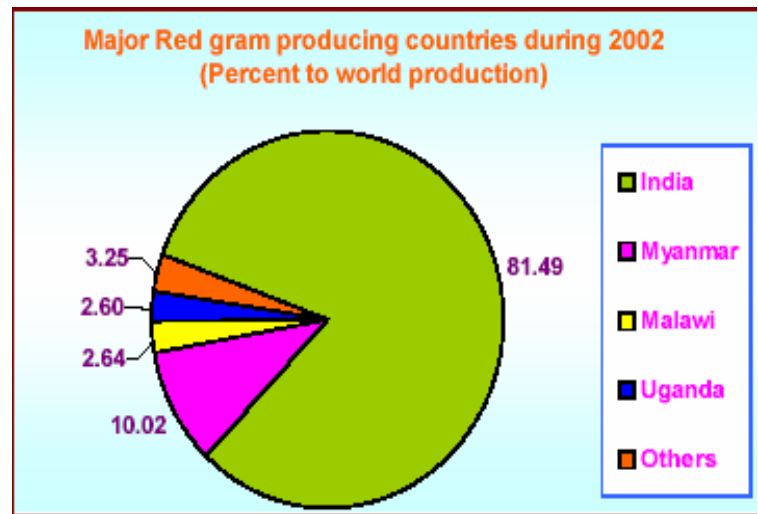
The major source of Irrigation is under K.C.Canal. There is a major irrigation project on Penna at Mylavaram. Pincha Project, Lower Sagileru Project, Upper Sagileru Project, Annamaya Project and Pulivendla Branch Canal are medium irrigation projects in the district. The Majority of the people here are depending on Agriculture only. The Major crops are paddy, Groundnut, Sunflower, Cotton, Betel leaves and Horticultural crops like Mango, Papaya, Banana, Lemon and Oranges. The gross cropped area in the district is 440816 Hectares out of this gross Irrigated area is 154607 Hectares.

EXTENT OF REDGRAM PRODUCTION IN INDIA, AP & KADAPA

Red gram is an important pulse crop in India. It is also known as Arhar and Tur in local parlance. India is the largest producer and consumer of red gram in the world. Red gram accounted for about 20 percent of the total production of pulses in the country during the year 2000-2001. India produces 25 lakh tones cultivated in 35 lakhs hectares and contributes 81% of the world production.

Major Red gram producing countries

Major red gram producing states in India are Maharashtra which is the largest producer of red gram accounting for nearly 33.49 percent of the total production followed by Uttar Pradesh (19.73 percent), Madhya Pradesh (12.18 percent), Andhra Pradesh (8.17 percent), Gujarat (8.13 percent) and Karnataka (6.34 percent). These six states together contribute about 88 % of the total production and about 88% of the total area in the country in 2001-2002.



State wise crop extent, production and yield

State	Area ('000 Hectares)		Production ('000 Tonnes)				Yield (kg/ha)				
	1999-2000	2000-2001	2001-002		19	2000-2001	2001-002		1999-2000	2000-2001	2001-2002
			(F)	%			(F)	%			(Final)
Andhra Pradesh	432.2	513	419	12.4	154.8	219	188	8.17	358	427	449
Bihar	66.5	43.7	42	1.24	82.1	58.9	53.8	2.34	1235	1348	1281
Gujarat	358	317.9	332.3	9.84	290.8	107.2	187	8.13	812	337	563
Karnataka	508.1	582.7	482	14.27	289.5	263.5	146	6.34	570	452	303
Madhya Pradesh	317.3	312.9	334.9	9.91	270.9	210.4	280.3	12.18	854	672	837
Maharashtra	1041	1096.1	1017.3	30.11	868	660.3	770.6	33.49	834	602	757
Orissa	136	149	141.6	4.19	85	75	78.6	3.42	625	503	555
Tamil Nadu	87.8	63.3	63.4	1.88	62.4	45.1	41.7	1.81	711	712	658
Uttar Pradesh	414.7	406.6	397.4	11.76	544	509.8	454	19.73	1312	1254	1142
Others	65.4	147.1	148.6	4.4	46.5	97.3	101.1	4.39	711	661	680
All India	3427	3	3	100	2694	22	2	100	786	618	681

Source: Department of Agriculture and Cooperation, New Delhi.

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Red gram is a protein rich staple food. It contains about 22% protein, which is almost three times that of cereals. Red gram supplies a major share of protein requirement of vegetarian population of the country. Red gram is

mainly consumed in the form of split pulse as Dal, which is an essential supplement of cereal-based diet. In addition to being an important source of human food and animal feed, red gram also plays an important role in sustaining soil fertility by improving physical properties of soil and fixing atmospheric nitrogen. Being a drought resistant crop, it is suitable for dry land farming and predominantly used as an intercrop with other crops.

Andhra Pradesh is the fourth largest state in the country in the production of red gram.

o *Seed Varieties used in the state*

SI.No	Duration	Type of varieties
1	Short	Parbhat', 'T 21', 'Pusa Ageti', 'BDN 2', 'PT 221'
2	Medium	5', 'GS 1', 'CPDM 1', 'F 52', 'C 28', 'SA 1', 'Palanadu'
3	Late	SA 1'

Kadapa depends on dry land agriculture. Red gram is widely grown in the district. During 2004 – 05 it was cultivated in 18000 hectares in both kharif and rabi seasons with an average yield per hectare recording 261 kgs and total production recorded was 5000 tones. The state average yield per hectare is 449 kgs while national highest yield per hectare is 1281 kgs therefore productivity can be enhanced drastically in red gram in the district. L.R. Palli, Galiveedu, Ramapuram, Chakrayapet, Rayachoti and Sambepalli mandals are major growers of red gram in the district.

RED GRAM SUB SECTOR STUDY IN KADAPA

Objectives of the Study

1. Understanding of the sub sector of red gram
2. Identification of Gaps/Constraints across value chain
3. Identification of opportunities and best Practices
4. Action plan preparation for the activities proposed based on the need and scope

Key questions posed for finding answers in the study

- Who are the primary actors in the sub sector; their roles and interrelationships
- What are the various market channels and trends within the sub sector
- What are the constraints and opportunities that are holding back growth and competitiveness related to Market Access, Technology and Product Development, Management and Organization, Input Supply, Finance, Policy and Operating Environment

STUDY METHODOLOGY

The study involves the collection and analysis of primary data from the key players like the farmers, input suppliers, buyers, processors, line departments, etc. and a review of secondary data available at the district level. Criteria for selection of the villages is based on the area sown and yield of the crop. Villages of the mandals where High/Moderate/Low yielding practices are considered. For the purpose for the study the cultivators (respondents) were categorized into small, medium and large cultivators. In each of the village three categories of cultivators would be taken as a sample for the study. The sample of BDS suppliers for the assessment would be based on types of services provided and the place from which they provide the services. The service providers are of two kinds basically institutional and individual.

RED GRAM PRODUCTION PROCESSES

○ *PRE PRODUCTION*

Land Preparation: Red gram being a deep rooted crop requires deep ploughing followed by 2-3 disking and harrowing followed by planking is essential. Soil should be well leveled so that water stagnation does not take place. Land is leveled and ploughed using tractor or bulls. The fertilizers are applied before sowing in one method and while sowing in another method. The sowing of the seed is based on the cropping pattern i.e. planting of mixed or single crop.

Spacing: A row spacing of 50-75 cm and plant to plant spacing of 15-20 cm is needed. In case of sowing in APRIL, a row spacing of 90-120 cm is recommended as the vegetative growth is much higher than June sowing. Depending upon the size of seed and spacing, 15-25 kgs of seed per hectare is sufficient.

Sowing: Red gram is traditionally a Kharif crop sown in June-July with onset of monsoon in various agro-climatic zones of India and the same in Andhra Pradesh too. Sowing of red gram before the onset of monsoon in the month of June is recommended for higher yields. Delay in planting, caused reduction in the duration of crop, plant height, number of branches and pods.

Method of Sowing: Red gram is generally broadcasted. Line sowing is superior over broadcasting. Broadcasting results in uneven plant population, which ultimately results in low yield.

○ *PRODUCTION*

Weed Management: The growth of Red gram is quite slow during first 45-60 days after sowing. On the other hand, weed growth is very fast due to frequent rains. During this period, if weeds are not controlled, they cover the

Red gram plants. Weeding twice, once at 25 days and another at 45 days after sowing, were found to be sufficient.

Natural and Biological Pest Control: High or low temperatures may slow down or stop their feeding and reproduction. Rainfall may wash some insects from the plants and drown them. Strong winds may dislodge some pests from the plants and prevent immigrating adults from landing on the crop. These abiotic factors combine with naturally occurring predators, parasitoids, and pathogens to constitute "natural pest control".

Pesticide Application: The pesticide chemicals must be spread evenly over the target areas of the crop (usually the upper foliage, flowers, and pods) in order to control the pests. Most application is in the form of sprays, using water as the carrier, through manually operated pumps.

Integrated Pest Management (IPM): All the farmers in an area should sow simultaneously, so that the pests will be diluted across the crop, rather than building up on the early flowering fields and then migrating to the later ones. Insecticides should only be applied when needed; this will seldom be before the flowering stage, so the natural enemies will have an opportunity to build up. If any means of biological pest control are available, then these should be used to replace or reduce insecticide use.

After harvest, the crop residues should be either removed and used as fuel, or ploughed in to the soil, to reduce the numbers of pests surviving from one season to the next.

Best Practices:

- Timely weeding with more labour
- Timely & adequate fertilizers and pesticide application based on soil testing
- Soil testing has to be intensified through Village organizations, Agricultural Extension Officers and also through the Resource organizations like FTC, KVK and ARS.

Economic Threshold: Pesticides should only be used when it is evident that the pest-caused damage that will be prevented will considerably higher than the cost of the treatment.

○ **HARVESTING**

○ *Maturity Period of Red gram for Harvesting*

Harvesting is usually done manually By using sickle to cut plants and vines, but occasionally by machines and is followed by drying and threshing. Harvested material is dried in the sun

Sl. No.	Varieties	Maturity period
1.	Short duration varieties	100-150 days
2.	Medium duration varieties	150-180 days
3.	Long duration varieties	180-300 days

in the threshing yard for about a week, depending on the weather conditions.

Threshing is done both manually and mechanically. Manual threshing involves beating vines and pods with sticks to separate out the seed, and in some places by trampling of cattle.

- *POST HARVESTING*

Processing of Dry Seed (Dehulling): Dehulling converts the whole seed into dhal (split pulse). Dehulling operation is usually performed in two steps; the first involves loosening the husk from the cotyledons and the second removing the husk from cotyledons and splitting them using a roller machine or stone chakki.

Dehulling is done in two methods i.e. one wet method – it involves water soaking, sun drying and dehulling; second dry method - it involves oil/water application, sun drying and dehulling. But normally large scale commercial dehulling of large quantities into dhal is done in mechanically operated mills and for small scale home processing method adopted by villagers using a stone chakki.

Storage Practices: Storage of food grains is an important aspect of Post Harvest Technology. Supply of food grains has to be maintained by proper storage throughout the year. Red gram is usually stored for long periods to ensure availability of whole seed at the time of sowing, and as a dhal to meet consumer requirement.

Methods of Storage: Methods of storage play an important role in reducing storage losses but they are only partially successful, because of poor storage conditions. Jute bags are frequently used to store Red gram. Seed treatment to reduce storage losses is becoming increasingly important. Toxic Chemicals are used to protect seed stocks against insects and seed borne pathogens. Coating of stored pulses with thin film of edible oil to protect them against insect infestation is an age old practice. Oil treated seeds were not preferred by pulse beetles. There is less pulse beetle infestation if Red gram is stored in the form of dhal. Use of chemicals can be avoided for control storage pests to make them safer consumable stocks.

Storage Pests: Pulse beetles popularly known as 'dhoras' are insects begin their infestation when the pods are in ripening stage in the field, subsequently carried with grain into the stores after harvesting, resulting in considerable losses. Seed characters such as size, colour and texture were not related to beetle preference. However seed coat thickness influence beetle incidence.

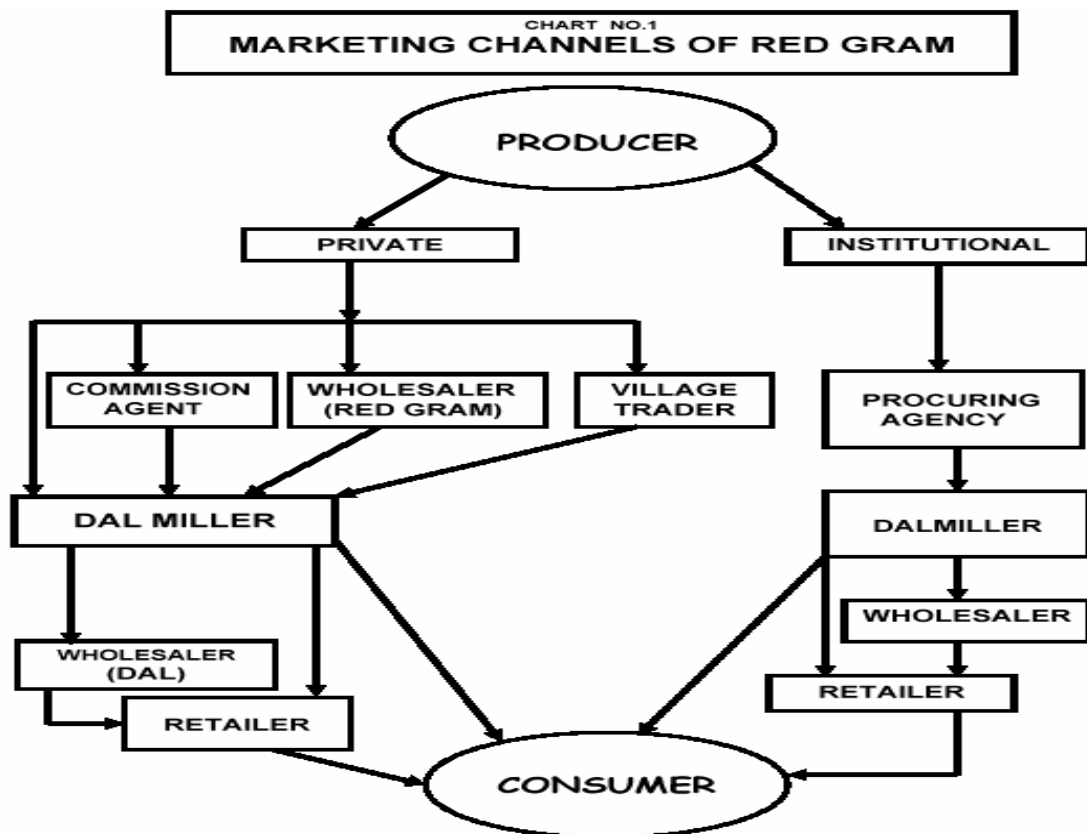
Marketing: Red gram is regarded as a crop mainly grown for domestic consumption that leaves little scope for surplus generation. Dhal (split pulse)

is the dominant form of Red gram sold to consumers, and the only form of Red gram marketed.

Red gram is sold directly by farmers in rural assembly market. It is sold to middle men and local dhal millers too. About 30% of the Red gram trade goes directly to local dhal mills, whole sale traders supply material to urban dhal millers. Retailers distribute dhal from millers to consumers.

Value addition: Processing Red gram yields 3 grades of dhal. 40-50% is of the best grade obtained from the first rolling; second rolling yields 35-40% of the second grade dhal; lower grade is 10-15% obtained from the immature deformed or damaged pods. Lower grade dhal is not usually sold separately but mixed with 2nd grade dhal for price advantage.

RED GRAM MARKETING VALUE CHAIN



Economics of production of organic & inorganic red gram as single crop in an acre

S.No	Name of the Input	Quantity per Acre	Cost per kg	Total Cost
Organic				
1	Hybrid seeds(LRG-30)	4 kgs	30.00	120.00
2	Green Manure	5 carts	0	0

3	Gunny bags	4 bags	11.00	44.00
	Total			164.00
	Inorganic			
1	Phosphate	50	11.00	550.00
2	Quinolphos	250ml	0	60.00
	Total			774.00

Economics of production of organic & inorganic red gram as mixed crop (with groundnut) in an acre

Sl.No	Name of the Input	Quantity per Acre	Cost per kg	Total Cost
	Organic			
1	Hybrid seeds	2 kgs	30.00	60.00
2	Green Manure	5 carts	0	0
3	Gunny bags	2 bags	11.00	22.00
	Total			82.00
	Inorganic			
1	Super	50 kgs	0	170.00
2	Monophos	200ml	0	83.00
	Total			335.00

FINDINGS OF THE STUDY

- As Kadapa is mainly semi arid region depends on dry land agriculture, red gram is widely grown in the district. During 2004 – 05 it was cultivated in 18000 hectares in both kharif and rabi seasons with an average yield 261 kgs per hectare and total production recorded was 5000 tones.
- The state average yield in red gram per hectare is 449 kgs while national highest yield per hectare is 1281 kgs, therefore crop productivity in red gram in kadapa can be enhanced drastically by promoting best practices in crop cultivation.
- Though L.R. Palli, Galiveedu, Ramapuram, Chakrayapet, Rayachoti and Sambepalli mandals are major growers of red gram but it is grown in the other places in the district as well.
- Secondary data analysis revealed that mostly poor peasants are cultivating Red gram either as main crop or as mixed crop. The farmers even prefer to grow red gram in crop sharing practice.
- Most of the growers are not satisfied in growing red gram mixed with with groundnut and are slowly shifting towards complete Red gram cultivation.

- Short duration varieties of Red gram recommended for Andhra Pradesh are Pragti (ICPL 87) and Durga (ICPL 84031). The maturity period for the former is 140-150 days and later 125 days. Red gram of A.P generally sent to Delhi, Assam and West Bengal.
- Generally farmers are growing long duration local Red gram as a mixed crop in groundnut. Yields are low because of spacing in cultivation, lack of high yielding varieties, fertilizers, pesticides and management practices like weeding, spacing etc.
- While most farmers are using local seed few farmers purchase hybrid seeds from L.R.Palle shop and block offices on 50% subsidy but only 4 kgs of seeds allowed on a farmer pass book. Germination in hybrid varieties is 70% but pest are eating away saplings after germination.
- Some farmers in the district area now using LRG-41 hybrid variety and 8 trials of ICRISAT varieties like Asha, Maruthi and ICPL-8702 as an inter crop performed better here.
- Farmers are mostly using local seed varieties and LRG 30 variety supplied by agriculture department on subsidy. But they are not using hybrid varieties like LRG 41.
- Not only the quality of the seed is not good but also availability on time is factor causing concern for farming community. Percentage of germination of seed 70% only.
- Loans for purchase of inputs are not accessible to poor farmers resulting inadequate supply of organic manures, chemical fertilizers and pesticides that shall have impact on crop productivity while government subsidy is restricted to seeds only.
- *Suitable soils for Red gram: Red gram requires light textured and well drained soil. Though, it is grown on a wide range of soils ranging from sandy to clay. Soil should be neutral in reaction and well drained. It can be grown successfully on soils having pH range of 6.5 to 7.5*
 - Lack of application of scientific knowledge in seed treatment and sowing. Recommended row spacing is not followed by farmers
 - There is limited extension support from the agricultural department and other agencies like KVK, ARS, DAATCC& ATMA for the development of red gram crop in the district
 - Soil testing, integrated farming methods and IPM are not practiced and at the same time labour costs are very high
 - Marketing Problems: Prices are plummeting after harvest. There is absence of measuring as per grades and standards of crop
 - Market information is not available to farmers
 - Red gram is not traded under AMCs and there is distressed sale due to financial crisis, farmers are forced to sell their produce just after harvesting.

During this period, farmers get lower price due to glut in the market. The producers cannot withhold or store their produce for some period to get better price since the farmers have to meet urgent requirement of money.

- Adoption of standards: Farmers usually do not grade their produce, as a result they do not get remunerative price in the market.
- Inadequate storage facilities: Due to inadequate storage facilities in rural areas, farmers lose a substantial quantity of their produce by way of drying, spoilage, rodents etc. Farmers are also forced to sell their produce just after harvest due to lack of storage facilities. Hence, rural godowns are must to avoid the sale immediately after the harvest.
- Malpractices in markets: There are many malpractices prevailing in markets like excess weighing, delay in payment, large quantity of samples from the produce, different kinds of arbitrary deductions for religious and charitable purposes from producers, high commission charges, delay in weighing, loading, unloading and weighing charges from producers.
- Superfluous middlemen: The existence of a long chain of middlemen reduces the share of the consumer's price received by the producer-seller.

STRATEGIES AND RECOMMENDATIONS

Red gram is predominantly grown in Kadapa district in about 18000 hectares and has the potential to increase the income of poor people, where CBOs can be involved in various activities like seed distribution, promotion of non pesticide and organic practices to reduce cost of production, value addition and marketing.

Best Practices:

- Improved seed from market
- Use of adequate organic manures
- Adequate quantity of fertilizers (2 bags instead of 1 bag)
- No dependency of money lenders, but taking loans from institutional sources

Interventions:

- Collective purchase of inputs to break the cycle (of money lender and distress sale) through SHGs/ Village Organisation /or Mandal Samakyas
- Bulk purchase through Zilla Samakya based on the indent given by the respective Mandal Samakyas(inturn collect from VOs and through SHGs)
- Promoting seed production & village seed banks intensively for Red gram under Productivity Enhancement fund under DWMA Watersheds in collaboration with Village Organization (VO-PE& EP Fund)

- The same above can also be intensified through the resource institutions like KVK, ARS and FTC.
- Linkages to institutional sources (corporate, Govt. Research etc) for inputs
- Promoting production & use of bio-fertilizers and pesticides
- Promoting institutional sources for bulk credit requirement on collective basis

- Common facilitation centers through Village Organisations (IKP-DRDA) where the implements, tools and machinery can be kept for hire services based on the local potential calculation. It could even be for two to three village organizations based on the above calculations

Calendar-Based Application

The application of pesticides "according to the calendar" is widely practiced on Red gram in areas where *Helicoverpa* is a major pest in worst years. When they have invested a great deal of labour and other resources in a crop, the additional cost of pesticides as an insurance against crop loss appears good value. Farmers must be encouraged to monitor their crops from the flower bud stage, and to be prepared to spray as soon as they see more than a few *Helicoverpa* eggs or larvae on the crop. Repeat the application at 10-day intervals if there are still many pests on the crop.

Institutional marketing channel:

Some institutions have been entrusted with marketing activities of Red gram like National Agricultural Co-operative Marketing Federation of India Limited (NAFED). NAFED is the nodal agency for procuring Red gram for providing minimum support prices to the farmers for their produce.