# Economics of organic versus chemical farming for three crops in Andhra Pradesh, India

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## Abstract

To tackle the challenge of food grain production and food security, chemical agriculture advocates call for the continuing or higher use of chemical fertilizers and synthetic pesticides. However, the continuous use and higher reliance on these inputs can lead to a reduction in crop productivity, deterioration in the quality of natural resources and the eco-system. Organic farming offers a solution for sustainable agricultural growth and safeguarding the ecosystem. A conversion from chemical farming to organic farming can be a lengthy process, and during its course the farmer may incur a loss in income. The farmer will switch over only when he is convinced that in the long run, the benefits from organic farming are more than from chemical farming. A study of the economics of organic versus chemical farming may help policy makers to take appropriate measures for the spread of organic farming, which in turn has a bearing on the incomes of farmers, health conditions of the people and the environment. The present study compared the economics of organic farmers (N=350) and chemical farmers (N=200) for three crops, paddy, redgram, and groundnuts, in the state of Andhra Pradesh, a south eastern coastal state of India. It was found that organic farmers are earning a gross income of 5%, 10% and 7% more compared to the chemical farmers of paddy, redgram and groundnut, respectively, and with lower input costs the profits earned by the organic farmers are higher by 37%, 33% and 59% for the selected crops respectively. Organic farming is generally more profitable in terms of financial costs and returns than chemical farming, irrespective of the crop or the size of farm (the exceptions being small redgram farms and large goundnut farms). An analysis of the farmers' perception of organic farming reveals that electronic media (television) is the prime motivator for farmers to adopt organic practices. Farmers believed that organic farming improves soil fertility and their profits in the long run.

**Keywords:** Organic farming, conventional farming, organic agriculture, organic certification, eco-system, sustainable agriculture, paddy, redgram, groundnuts.

## Introduction

Agriculture is the backbone of the Indian economy and India ranks second worldwide in farm output (CIA, 2012). Agriculture and allied sectors including forestry and logging accounted for 16% of the Gross Domestic Product (GDP) in 2010, employed 52% of the total workforce and despite a steady decline of its share in the GDP, it is still the largest economic sector and plays a significant role in the overall socio-economic development of India. To tackle the problem of food grains production, the Indian government has launched several programmes and of them, the Green Revolution of the mid 1960s has

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been regarded as the most successful. However, although the so called Green Revolution resolved some issues of food production, it made most of the Indian farmers dependent on chemical fertilizers and pesticides, and has degraded soil fertility and the environment.

The negative consequences of the higher use of chemical fertilisers and pesticides include a reduction in crop productivity and deterioration in the quality of natural resources (Pretty & Ball, 2001). Some studies have pointed out that the environment will be effected by the carbon emissions of the agricultural system as agriculture releases about 10-12% of the total green house gas emissions which is accounted for as about 5.1 to 6.1 Gt CO2 (Cole et al., 1997; Joshi, 2010).

A response to the uptake of agricultural chemicals, has been the search for ways to move beyond the problem of heavy usage of chemical fertilizers and pesticides. Organic farming is a proposed remedy to the problem of chemical input dependency and also for achieving the sustainability of the agricultural sector in the long run. Organic agriculture also has the potential to reduce the emission of greenhouse gases by crop management agronomic practices. Nitrogen application rates in organic farming are reportedly 62-70% lower than chemical agriculture (Kramer et al. 2006). Further, it is reported that yields of crops grown under organic farming system are comparable to those under a conventional system and greenhouse gasses emissions from organic farming are 36% lower than a chemical system of crop production (Nemecek et al., 2005).

The area certified under organic crops in India has grown from 1,711 hectares to 1,180,000 ha. during the decade 2001-2011, a 68,900% increase, and only Uruguay showed a faster uptake over this period (Paull, 2011). However the proportion of the area under organic crops is only 0.6% of the total agricultural land (Willer, Lernoud & Kilcher, 2013). The growing demand for organic agricultural products in the advanced countries paves the way for developing economies to grow their export market for organic agricultural products. By international standards, conversion of a chemical farm into an organic farm will take three years and during the first two years, the farmer may incur a loss in farming production (Wyss, 2004). In this context, a study of the economics of organic farming as compared to chemical farming may throw light on the problems in the spread of organic farming. The main objective of this study is to analyse the cost of and returns from organic farming vis-à-vis chemical farming practices in the Indian context.

## Review of Literature

Charyulu & Biswas (2010) in a study of four states in India (Gujarat, Maharashtra, Punjab and Uttar Pradesh) concluded that the unit cost of production is lower in organic farming in the cases of cotton and sugarcane (compared to chemical farming), whereas it is higher for paddy and wheat. Acs et al., (2006) have developed a dynamic linear programming model to analyse the effects of different limiting factors on the conversion of chemical to organic farming process of farms over time. The modelling developed for a typical arable farm in the Netherlands central clay region, is based on two static linear programming models (conventional and organic), with an objective to maximise the net present value over a 10-year planning horizon. The results reported are that organic farming is more profitable than chemical farming. Raj et al. (2005) concluded that the profitability of organic cotton was significantly higher than that of chemical cotton, the major contributing factor being reduced expenditure on pest control management (PCM).

Prasad (2005) in an account of organic farming vis-à-vis modern agriculture in the Indian context stated that during 2003 organic farming was practiced only on 4800 ha in India. This has resulted in earning Rs. (Rupees) 89 crores of foreign earnings through exports and the study also pointed out that Indian exports of organic products constitute only 0.8% of the global organic produce market (Prasad, 2005). However, India is now a world leader in organic agriculture, following the recent uptake of organic agriculture, and is now number five in the world on the basis of certified organic hectares (Paull, 2011).

## Methodology and Sample Design

This study is based on primary data collected from farmers. The sample households were selected by using a multi-stage stratified random sampling technique. The State of Andhra Pradesh is the study area and three major crops, one each from cereals, pulses and oilseeds viz., paddy, redgram and groundnut, have been selected based on the proportion of area under organic farming. Among the 23 districts of Andhra Pradesh, the districts of East Godavari, Mahabubnagar and Anantapur have been selected as they are predominantly cultivating the selected crops under organic farming. In the second stage 250 paddy cultivating households comprising 150 organic farmer households and 100 chemical (sometimes called 'conventional') farmer households have been selected from East Godavari District. From Mahabubnagar District, 150 redgram cultivating households comprising 100 organic farmer households and 50 chemical farmer households have been selected. From Anantapur District 150 Groundnut cultivating households comprising 100 organic farmer households and 50 chemical farmer households have been selected (Table 1). The selection of sampling units in each district for each crop is based on the stratified random sampling technique. A pre-tested schedule has been canvassed among the selected sample holdings to elicit information on the cost of cultivation and returns etc. The reference year of the study is 2010-11.

**Table 1: Distribution of Sample Households by Crop, Farm size and Farming Practice.**

| Organic Farmers | | | | |
|---|---|---|---|---|
| Crop | Small | Medium | Large | All Farms |
| Paddy | 55 (36.67%) | 66 (44.00) | 29 (19.33) | 150 (100.00) |
| Redgram | 38 (38.00%) | 34 (34.00) | 28 (28.00) | 100 (100.00) |
| Groundnut | 35 (35.00%) | 41 (41.00) | 24 (24.00) | 100 (100.00) |
| Total | 128 (36.57%) | 141 (40.29) | 81 (23.14) | 350 (100.00) |
| Chemical Farmers | | | | |
| Paddy | 39 (39.00%) | 36 (36.00) | 25 (25.00) | 100 (100.00) |
| Redgram | 14 (28.00%) | 25 (50.00) | 11 (22.00) | 50 (100.00) |
| Groundnut | 16 (32.00%) | 22 (44.00) | 12 (24.00) | 50 (100.00) |
| Total | 69 (34.50%) | 83 (41.50) | 48 (24.00) | 200 (100.00) |

**Note:** Figures in parentheses indicate percentages to totals.

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## Concepts used in the Study

**Small Farms:** Farms with the size up to 5.0 acres have been treated as Small Farms.

**Medium Farms:** Farms with the size from 5.01 to 10.00 acres have been treated as Medium Farms.

**Large Farms:** Farms with the size above 10.01 acres have been treated as Large Farms.

***Concepts of Cost of Cultivation***

**Cost $A_1$**: Cost $A_1$ includes:

- Value of hired human labour
- Value of owned and hired bullock labour
- Value of owned and hired machine labour
- Value of owned and purchased seed
- Value of owned and purchased manures
- Value of fertilisers and pesticides
- Depreciation on farm implements, farm buildings etc.
- Irrigation charges
- Interest on working capital
- Land revenue, cess (local government taxes, e.g. water) and other taxes paid, and
- Other miscellaneous expenses.

**Cost $A_2$**: Cost $A_1$ + Rent paid for the leased-in land.

**Cost $B_1$**: Cost $A_1$ + Interest on the value of owned capital assets (excluding land).

**Cost $B_2$:** Cost $A_1$ + Rent paid for the leased-in land + Rental value of the owned land (net of land revenue).

**Cost $C_1$**: Cost $B_1$ + Imputed value of family labour.

**Cost $C_2$**: Cost $B_2$ + Imputed value of family labour.

***Concepts of Income***

**Gross Income:** Synonymous with value of output (both main and by products).

**Farm Business Income:** Gross Income – Cost $A_2$

**Family Labour Income:** Gross Income – Cost $B_2$

**Net Income:** Gross Income – Cost $C_2$

**Farm Investment Income:** Net Income + Rental value of own land + interest on owned fixed capital.

The standard concepts of costs and returns from farming as used in the Farm Management Studies (FMS) sponsored by the Directorate of Economics and Statistics, Ministry of Agriculture (Government of India, 2010), have been adopted in the present

study, and the results are analysed and the perceptions of farmers on various issues relating to organic farming are presented.

***Cost of Cultivation***

The cost of pesticides, which constitute a major share in the total costs for Indian farmers, may be negligible for organic farming compared to chemical farming, since organic pesticides may be homemade for Indian farmers and prepared with locally available herbs. As a result, the organic farmers can potentially achieve higher returns compared to their counterparts. In addition, chemical fertilisers are not supposed to be used in the case of organic farming and this exclusion can result in further input savings. Though some other studies treated farm yard manure (FYM) as a component of chemical fertilisers, the present study considered FYM as organic fertiliser. Except for this minor difference, costs of remaining components that are necessary for calculating various cost concepts as per the Farm Management Studies (FMS) are used in the present study.

For studying the intensity of resource-use pattern, the total cost i.e. Cost $C_2$ has been adopted. Cost $C_2$ is considered as the total cost and it includes the expenditure incurred on all the paid-out costs including seed, hired human labour, bullock labour (owned and hired), machine labour (owned and hired), farm yard manure (owned and purchased), chemical fertilizers, pesticides, irrigation charges, rent paid on leased-in land, etc., and imputed costs including depreciation on farm capital assets, interest on working capital, interest on farm fixed capital, rental value of owned land, and the imputed value of family labour etc.

***Resource Use Pattern***

To ascertain the relative importance of different inputs in the cost structure, an item-wise breakup of the total cost is computed. The details for organic and chemical holdings on the basis of per acre for different size groups of farms are presented in Table 2.

The total cost per acre on organic farm holdings of the three selected crops viz., paddy, redgram and groundnut worked out to be Rs.21,549/-, Rs.7,717/- and Rs.17,903/- respectively, whereas on chemical holdings these values are Rs.23,989/-, Rs.8,468/- and Rs.21,349/- which clearly showed that the cost of cultivation for chemical holdings is higher by 11%, 10% and 19%, respectively, compared to organic farming households for the three selected crops (Table 2).

Among the various inputs, hired human labour, machine labour, farmyard manure, pesticides, seed and bullock labour appeared to be predominant in the cost structure for both organic and chemical farms, for all the three selected crops (Table 2).

In the case of organic paddy farms, apart from the imputed costs, the proportion of expenditure incurred on human labour accounts for about 32% of the total cost (Table 2). This is followed by the proportion of expenditure incurred on organic fertiliser (10%), machine labour (8%), pesticide (2%), seed (2%) etc. A similar pattern with minor variations in the proportions could be observed among different size groups of farms. It could be also observed that the proportion of expenditure on human labour to total cost has exhibited a direct relationship with farm size.

As far as the cost structure of the organic redgram farms is concerned, again the expenditure on human labour appeared to be predominant (30%) and this is followed by

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organic fertiliser (14%), pesticides (8%), bullock labour (7%), machine labour (3%) and seed (2%) (Table 3).

With regard to organic groundnut farms, the expenditure on human labour constitutes about 38% of the total cost and it is followed by seed (12%), bullock labour (8%), organic fertiliser (7%), pesticides (6%) and machine labour (2%) (Table 4).

On the other hand, in the case of chemical farms, of the three selected crops, the proportion of expenditure to total cost incurred on human labour is the highest, viz. 28%, 29% and 34% for paddy, redgram and groundnut respectively (Tables 1, 2 and 3).

With regard to the other components of the total cost for chemical paddy farms, the expenditure on human labour is followed by machine labour (8%), fertilisers (6%), pesticides (2%), seed (2%) and farm yard manure (2%). With regard to the conventional redgram farms, the expenditure on human labour is followed by fertiliser (11%), pesticides (7%), bullock labour (6%), machine labour (3%) and seed (2%).

With regard to the chemical groundnut farms, the expenditure on human labour is followed by pesticides (12%), seed (11%), bullock labour (7%), fertiliser (5%) and machine labour (4%).

**Table 2: Cost of Cultivation of Paddy**

(Value In Rupees (Rs.))

| Farm Resources | Organic | | | | Chemical | | | |
|---|---|---|---|---|---|---|---|---|
| | Small | Medium | Large | All Farms | Small | Medium | Large | All Farms |
| Human Labor | 6030 (27.08%) | 5958 (28.68) | 8029 (36.41) | 6870 (31.88) | 7931 (30.07) | 6561 (26.85) | 6617 (28.88) | 6812 (28.40) |
| Bullock Labour | 385 (1.73%) | 32 (0.16) | 125 (0.57) | 124 (0.58) | 478 (1.81) | 70 (0.29) | 128 (0.56) | 166 (0.69) |
| Machine Labour | 1577 (7.08%) | 1883 (9.06) | 1646 (7.47) | 1735 (8.05) | 1920 (7.28) | 1874 (7.67) | 1910 (8.34) | 1900 (7.92) |
| Seed | 455 (2.04%) | 476 (2.29) | 452 (2.05) | 462 (2.15) | 587 (2.22) | 509 (2.08) | 518 (2.26) | 526 (2.19) |
| Organic Fertilisers/ Fertilisers | 2250 (10.11%) | 2213 (10.65) | 2058 (9.33) | 2151 (9.98) | 1813 (6.88) | 1774 (7.26) | 1792 (7.82) | 1790 (7.46) |
| Organic Pesticides/ Pesticides | 466 (2.09%) | 537 (2.58) | 407 (1.85) | 470 (2.18) | 836 (3.17) | 683 (2.80) | 393 (1.72) | 563 (2.35) |
| Others | 476 (2.14%) | 546 (2.63) | 345 (1.56) | 448 (2.08) | 624 (2.37) | 668 (2.74) | 310 (1.35) | 482 (2.01) |
| Interest on working capital | 728 (3.27%) | 255 (1.23) | 245 (1.11) | 320 (1.49) | 887 (3.36) | 759 (3.11) | 729 (3.18) | 765 (3.19) |
| Depreciation | 624 (2.80%) | 308 (1.48) | 249 (1.13) | 329 (1.53) | 680 (2.58) | 687 (2.81) | 697 (3.04) | 691 (2.88) |
| Rent Paid on Leased-in land | 0 (0.00%) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 689 (2.61) | 1905 (7.80) | 749 (3.27) | 1129 (4.70) |
| Interest on Fixed Capital | 1301 (5.84%) | 626 (3.01) | 742 (3.37) | 775 (3.60) | 1304 (4.94) | 443 (1.81) | 779 (3.40) | 751 (3.13) |
| Rental Value of Owned Land | 7500 (33.68%) | 7500 (36.10) | 7500 (34.01) | 7500 (34.80) | 8000 (30.33) | 8000 (32.74) | 8000 (34.91) | 8000 (33.35) |
| Imputed Value of Family Labour | 477 (2.14%) | 439 (2.11) | 251 (1.14) | 363 (1.68) | 625 (2.37) | 499 (2.04) | 291 (1.27) | 415 (1.73) |
| Total | 22270 (100%) | 20773 (100%) | 22051 (100%) | 21549 (100%) | 26373 (100%) | 24432 (100%) | 22914 (100%) | 23989 (100%) |

*Source: Primary survey. Note: Figures in parenthesis denote percentage.*

**Table 3: Cost of Cultivation of Redgram**

(Value In Rupees (Rs.))

| Farm Resources | Organic | | | | Chemical | | | |
|---|---|---|---|---|---|---|---|---|
| | Small | Medium | Large | All Farms | Small | Medium | Large | All Farms |
| Human Labor | 2106 (29.73%) | 2468 (31.65) | 2348 (29.96) | 2350 (30.45) | 2360 (28.61) | 2475 (28.88) | 2397 (28.47) | 2429 (28.68) |
| Bullock Labour | 447 (6.31%) | 524 (6.72) | 545 (6.95) | 524 (6.80) | 496 (6.01) | 525 (6.13) | 527 (6.25) | 522 (6.17) |
| Machine Labour | 199 (2.80%) | 233 (2.99) | 242 (3.09) | 233 (3.02) | 221 (2.68) | 233 (2.72) | 234 (2.78) | 232 (2.74) |
| Seed | 119 (1.68%) | 140 (1.79) | 145 (1.85) | 140 (1.81) | 133 (1.62) | 140 (1.64) | 139 (1.65) | 139 (1.64) |
| Organic Fertilisers/ Fertilisers | 894 (12.62%) | 1048 (13.44) | 1090 (13.91) | 1049 (13.59) | 1187 (14.39) | 1428 (16.66) | 1165 (13.83) | 1291 (15.23) |
| Organic Pesticides/ Pesticides | 497 (7.01%) | 582 (7.46) | 606 (7.73) | 583 (7.55) | 554 (6.71) | 584 (6.81) | 585 (6.95) | 581 (6.86) |
| Others | 447 (6.31%) | 524 (6.72) | 545 (6.95) | 524 (6.80) | 496 (6.01) | 525 (6.13) | 527 (6.25) | 522 (6.17) |
| Interest on working capital | 294 (4.15%) | 345 (4.42) | 345 (4.40) | 338 (4.38) | 340 (4.13) | 369 (4.31) | 348 (4.14) | 357 (4.22) |
| Depreciation | 170 (2.39%) | 228 (2.92) | 255 (3.25) | 234 (3.04) | 230 (2.78) | 240 (2.80) | 242 (2.88) | 240 (2.83) |
| Rent Paid on Leased-in land | 0 (0.00%) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 249 (3.02) | 347 (4.05) | 525 (6.23) | 408 (4.82) |
| Interest on Fixed Capital | 364 (5.14%) | 108 (1.39) | 102 (1.30) | 142 (1.84) | 391 (4.74) | 102 (1.19) | 130 (1.55) | 149 (1.76) |
| Rental Value of Owned Land | 1250 (17.64%) | 1250 (16.03) | 1250 (15.95) | 1250 (16.20) | 1250 (15.15) | 1250 (14.59) | 1250 (14.85) | 1250 (14.76) |
| Imputed Value of Family Labour | 298 (4.21%) | 349 (4.48) | 363 (4.64) | 350 (4.53) | 342 (4.14) | 350 (4.09) | 351 (4.17) | 350 (4.13) |
| Total | 7086 (100%) | 7798 (100%) | 7837 (100%) | 7717 (100%) | 8249 (100%) | 8569 (100%) | 8419 (100%) | 8468 (100%) |

*Source: Primary survey. Note: Figures in parenthesis denote percentage.*

**Table 4: Cost of Cultivation of Groundnut**

(Value In Rupees (Rs.))

| Farm Resources | Organic | | | | Chemical | | | |
|---|---|---|---|---|---|---|---|---|
| | Small | Medium | Large | All Farms | Small | Medium | Large | All Farms |
| Human Labour | 8006 (37.22%) | 7251 (37.02) | 6021 (37.80) | 6699 (37.42) | 7111 (33.8) | 6993 (34.41) | 7620 (34.24) | 7314 (34.26) |
| Bullock Labour | 1786 (8.30%) | 1617 (8.26) | 1343 (8.43) | 1494 (8.35) | 1333 (6.34) | 1311 (6.45) | 1429 (6.42) | 1371 (6.42) |
| Machine Labour | 431 (2.00%) | 390 (1.99) | 324 (2.04) | 361 (2.01) | 815 (3.87) | 801 (3.94) | 873 (3.92) | 838 (3.93) |
| Seed | 2648 (12.31%) | 2398 (12.24) | 1992 (12.50) | 2216 (12.38) | 2321 (11.03) | 2282 (11.23) | 2487 (11.18) | 2387 (11.18) |
| Organic Fertilisers/ Fertilisers | 1540 (7.16%) | 1394 (7.12) | 1158 (7.27) | 1288 (7.20) | 1385 (6.58) | 1362 (6.70) | 1484 (6.67) | 1424 (6.67) |
| Organic Pesticides/ Pesticides | 1386 (6.44%) | 1255 (6.41) | 1042 (6.54) | 1159 (6.48) | 2548 (12.11) | 2506 (12.33) | 2731 (12.27) | 2621 (12.28) |
| Others | 1176 (5.47%) | 1065 (5.44) | 885 (5.55) | 984 (5.50) | 1111 (5.28) | 1093 (5.38) | 1191 (5.35) | 1143 (5.35) |
| Interest on working capital | 1061 (4.93%) | 961 (4.90) | 798 (5.01) | 888 (4.96) | 1039 (4.94) | 1022 (5.03) | 1113 (5.00) | 1069 (5.01) |
| Depreciation | 575 (2.67%) | 526 (2.68) | 528 (3.31) | 533 (2.98) | 389 (1.85) | 589 (2.90) | 741 (3.33) | 642 (3.00) |

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| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Rent Paid on Leased-in land | 0 (0.00%) | 0 (0.00) | 0 (0.00) | 0 (0.00) | 161 (0.77) | 259 (1.28) | 290 (1.31) | 264 (1.23) |
| Interest on Fixed Capital | 1164 (5.41%) | 1060 (5.41) | 282 (1.77) | 662 (3.70) | 987 (4.69) | 279 (1.37) | 393 (1.77) | 414 (1.94) |
| Rental Value of Owned Land | 1000 (4.65%) | 1000 (5.11) | 1000 (6.28) | 1000 (5.59) | 1000 (4.75) | 1000 (4.92) | 1000 (4.49) | 1000 (4.68) |
| Imputed Value of Family Labour | 739 (3.44%) | 669 (3.42) | 556 (3.49) | 618 (3.45) | 840 (3.99) | 826 (4.06) | 900 (4.04) | 863 (4.04) |
| Total | 21513 (100%) | 19587 (100%) | 15927 (100%) | 17903 (100%) | 21041 (100%) | 20323 (100%) | 22253 (100%) | 21349 (100%) |

*Source: Primary survey. Note: Figures in parenthesis denote percentage.*

The figures reveal that the proportion of expenditure on organic fertilisers is higher for organic paddy farms when compared with the expenditure on fertilisers on chemical paddy farms. However, the total cost per acre on organic farms is lower than that on chemical farms due to the lower expenditure on other inputs. A similar picture with slight variations in proportions can be observed with regard to the redgram and groundnut producers (Tables 2, 3, 4).

### *Returns from Farming*

The per acre returns from cultivation in both categories of farms are analysed by calculating the following concepts of returns: gross returns, farm business income, family labour income, farm investment income, and net income. The details for the selected three crops, viz. paddy, groundnut and redgram, are presented in Table 5.

### *Gross Income*

Gross income per acre for all organic (paddy, redgram and groundnut) farmers is Rs. 30,221/-, Rs.13646/- and Rs.26335/- respectively and for chemicall farmers it is Rs. 28,717/-, Rs.12387/- and Rs.24626/- respectively, which indicates that the organic farmers are earning 5%, 10% and 7% more income compared to the chemical farmers of paddy, redgram and groundnut. Except for the large farmers of groundnut and the small farmers of redgram, all the other groups of farmers from the organic category are earning more income per acre compared to their counterparts in the chemical category. Gross income per farm is also higher for the organic category farms compared to the chemical category farms. The size group wise analysis also shows the same picture though with slight variations in the amounts. It can be concluded that the gross income per acre is generally greater for the organic category irrespective of the farm size or the crop - the exceptions being the small redgram and the large groundnut farms (Table 5).

### *Farm Business Income*

Farm business income represents returns to the farmer's land, family labour, fixed capital and management. It is calculated by deducting the Cost $A_1$ or $A_2$, as the case may be, from the gross returns. Table 5 reveals that the farm business income per acre for organic farms is Rs.16568/-, Rs.7671/- and Rs.10713/- for the three selected crops respectively and it is 16%, 26% and 48% higher than the chemical farm holdings. The size group wise analysis exhibits similar picture with slight variation in percentages except the small farmers of redgram. The small farmers of organic redgram are getting lesser farm business income compared with the other groups of farmers and with other crops of farms also (Table 5).

**Table 5: Different Types of Returns of Cultivation Per Acre for Three Crops**

(Value In Rupees (Rs.))

| | Organic | | | | | Chemical | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| Farm Size | Gross Returns | Farm Business Income | Family Labour Income | Farm Investment Income | Net Income | Gross Returns | Farm Business Income | Family Labour Income | Farm Investment Income | Net Income |
| | Paddy | | | | | Paddy | | | | |
| Small | 28818 | 16128 | 8628 | 16952 | 8151 | 28733 | 12288 | 4288 | 12966 | 3663 |
| Medium | 30502 | 18342 | 10842 | 18342 | 10403 | 29252 | 13761 | 5761 | 13705 | 5262 |
| Large | 30424 | 16693 | 9193 | 17184 | 8942 | 28353 | 14509 | 6509 | 14997 | 6218 |
| All farms | 30221 | 16568 | 9068 | 16981 | 8706 | 28717 | 13895 | 5895 | 14231 | 5480 |
| | Redgram | | | | | Redgram | | | | |
| Small | 12721 | 7548 | 6298 | 7614 | 6000 | 13905 | 7639 | 6389 | 7689 | 6047 |
| Medium | 13494 | 7403 | 6153 | 7403 | 5804 | 12013 | 5146 | 3896 | 4897 | 3545 |
| Large | 13971 | 7850 | 6600 | 7589 | 6237 | 12360 | 5672 | 4422 | 5451 | 4071 |
| All farms | 13646 | 7671 | 6421 | 7463 | 6071 | 12387 | 5667 | 4417 | 5466 | 4067 |
| | Groundnut | | | | | Groundnut | | | | |
| Small | 31022 | 12413 | 11413 | 12838 | 10674 | 24000 | 5785 | 4785 | 5932 | 3945 |
| Medium | 27454 | 10597 | 9597 | 10597 | 8928 | 24102 | 5884 | 4884 | 5337 | 4058 |
| Large | 24460 | 10369 | 9369 | 10095 | 8813 | 25194 | 5234 | 4234 | 4728 | 3334 |
| All farms | 26335 | 10713 | 9713 | 10757 | 9095 | 24626 | 5554 | 4554 | 5105 | 3691 |

### *Family Labour Income*

Family labour income gives the return to the family labour and management of the crop enterprise, which is arrived at by deducting Cost $B_2$ from gross returns. Table 5 reveals that the family labour income per acre is positive for both the organic and chemical farmers and registered as Rs.9,068/-, Rs.6,421/- and Rs.9,713/- for the selected three organic crops respectively, and Rs.5,895/-, Rs.4,417/- and Rs.4,554/- for the selected three chemical crops. Family labour income for all size groups of farmers of the selected crops was greater for the organic farmers (with the exception of the small redgram farms) (Table 5).

### *Farm Investment Income*

Farm investment income represents income retained with the farmer for their investment and it comprises the rental value of own land, interest on own fixed capital, and returns to the management.

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The farm investment income per acre for organic farmers is reported as Rs.16,981/-, Rs. 7,463/- and Rs.10,757/- for the three selected crops respectively, while it is Rs.14,231/-, Rs.5,466/- and Rs.5,105/- respectively for chemical category farmers, which reveals that organic farmers in the study area are getting 16%, 27% and 53% higher farm investment incomes compared to their counterparts. The farm investment income for all the size-groups and for all the three crops is higher for the organic category (except for the small redgram farms) (Table 5).

### *Net Income*

Net income indicates the profit or loss from farm business. It is the residual of gross income after deducting total cost viz., Cost $C_2$ from it. Table 5 reveals that the farmers of all size groups of the selected crops under both organic and chemical category are achieving profits, but the profits earned by the organic farmers are higher by 37%, 33% and 59% for the selected crops respectively. A similar picture can be seen for the different size groups of farms except for the small farmers of redgram, where the organic farms are achieving less net income per acre.

The farm net income for all the size-groups and for all the three crops is higher for the organic category (except for the small redgram farms) (Table 5).

### *Perceptions of Organic Farmers*

The analysis of costs and returns of organic farming vis-à-vis chemical farming indicates that the organic farmers are accruing higher income compared to the chemical farmers. An attempt is made to analyse the experiences and perceptions of organic farmers to elicit information on the perceived advantages or otherwise of organic farming, by whom they were motivated to adopt organic farming, and the impact of organic farming on environment etc.

### *Experience*

Eighteen percent of the sample of organic farmers have been practicing organic farming since 2001 with the rest being more recent adopters. All of the selected organic farmers have passed the conversion period of three years for organic farming (Table 6).

**Table 6: Experience in Organic Farming**

| Adoption | ≤2001 | 2002 | 2003 | 2004 | 2005 | Total |
|---|---|---|---|---|---|---|
| Paddy | 32 (21.33%) | 33 (22.00) | 24 (16.00) | 36 (24.00) | 25 (16.67) | 150 (100%) |
| Redgram | 17 (17.00%) | 19 (19.00) | 25 (25.00) | 26 (26.00) | 13 (13.00) | 100 (100%) |
| Groundnut | 13 (13.00%) | 18 (18.00) | 22 (22.00) | 31 (31.00) | 16 (16.00) | 100 (100%) |
| All Crops | 62 (17.72%) | 70 (20.00) | 71 (20.28) | 93 (26.58) | 54 (15.42) | 350 (100%) |

**Table 7: Motivation for Adopting Organic Farming**

| Motivation | Extension Worker | Fellow Farmer | Village Leader | Village Co-operative | Print Media | Electronic Media | Total |
|---|---|---|---|---|---|---|---|
| Paddy | 24 (16.00%) | 21 (14.00) | 29 (19.33) | 12 (8.00) | 28 (18.66) | 36 (24.00) | 150 (100%) |
| Redgram | 16 (16.00%) | 9 (9.00) | 11 (11.00) | 29 (29.00) | 13 (13.00) | 22 (22.00) | 100 (100%) |
| Groundnut | 12 (12.00%) | 14 (14.00) | 13 (13.00) | 26 (26.00) | 18 (18.00) | 17 (17.00) | 100 (100%) |
| All Crops | 52 (14.86%) | 44 (12.57) | 53 (15.14) | 67 (19.14) | 59 (16.86) | 75 (21.43) | 350 (100%) |

**Table 8: Advantages from Organic Farming**

| Advantage | Increases the Soil Fertility | Lower Cost of Production | Good for Health | Yield is Constant Higher | Total |
|---|---|---|---|---|---|
| Paddy | 45 (30.00%) | 49 (32.67) | 35 (23.33) | 21 (14.00) | 150 (100%) |
| Redgram | 33 (33.00%) | 46 (46.00) | 4 (4.00) | 17 (17.00) | 100 (100%) |
| Groundnut | 41 (41.00%) | 35 (35.00) | 15 (15.00) | 9 (9.00) | 100 (100%) |
| All Crops | 119 (34.00%) | 130 (37.14) | 54 (15.43) | 47 (13.43) | 350 (100%) |

*Source: Primary Survey. Note: Figures in parenthesis denotes percentage.*

### *Motivation*

Electronic media has more impact on the switching over to organic farming than other sources of agency, with 21% of farmers nominating this agency, followed by village cooperative (19%), print media (17%), village leaders (15%), Agricultural Extension workers (15%), and fellow farmers (13%) (Table 7). Electronic media for these farmers means predominantly television programmes, such as agricultural programmes including Annadata, Ryutumitra, and Gramadarshini (Telugu Daily Programmes between 6.30 to 7.00 am).

### *Advantages*

The sample farmers of the study area based on their experience in organic farming reported advantages of organic farming which are consistent with the results of previous studies. Around 34% of them reported that the fertility of soil is being increased because of organic farming. Around 37% of them reported that the cost of cultivation has come down (due to non-usage of synthetic fertilisers and pesticides). Further around 15% of them reported that the organic produce is good for health, while another 13% of them have reported that they are getting higher and regular returns from organic farming (Table 8).

### *Certification*

It is disappointing to note that out of the selected organic farmers none has obtained certification, although all have been practicing organic farming since 2005 or earlier. Most of the farmers expressed that they are not planning on getting certification for their

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organic produce. The reasons as expressed are, it is highly expensive (66%), followed by lack of information on the certification process (27%) and small size of farm holdings (7%) (Table 9).

**Table 9: Reasons for not getting Certification for Organic Produce**

| Reason | Highly expensive | Lack of sufficient information | Small size of farm | Total |
|---|---|---|---|---|
| Paddy | 95 (63.33%) | 45 (30.00%) | 10 (6.67%) | 150 (100%) |
| Redgram | 71 (71.00%) | 23 (23.00%) | 6 (6.00%) | 100 (100%) |
| Groundnut | 65 (65.00%) | 28 (28.00%) | 7 (7.00%) | 100 (100%) |
| All Farms | 231 (66.00%) | 96 (27.42%) | 23 (6.58%) | 350 (100%) |

**Table 10: Problems of Farmers in Organic Farming**

| Problem | Marketing the produce | Difficulty in getting certification | Lack of government support |
|---|---|---|---|
| Paddy | 143 (95.33%) | 150 (100%) | 150 (100%) |
| Redgram | 92 (92.00%) | 100 (100%) | 100 (100%) |
| Groundnut | 97 (97.00%) | 100 (100%) | 100 (100%) |
| All Farms | 332 (94.85%) | 350 (100%) | 350 (100%) |

**Table 11: Farmers Suggestions for Spread of Organic Farming**

| Suggestion | Subsidies of organic inputs | Govt. support for certification and marketing | Department of agriculture for technical support |
|---|---|---|---|
| Paddy | 140 (93.34%) | 150 (100%) | 150 (100%) |
| Redgram | 85 (85.00%) | 100 (100%) | 100 (100%) |
| Groundnut | 89 (89.00%) | 100 (100%) | 100 (100%) |
| All Farms | 314 (89.71%) | 350 (100%) | 350 (100%) |

*Source: Primary Survey.*

### *Problems*

When information was elicited as to the other problems almost all respondents reported that they have been facing problems in marketing their produce as their product lacks certification. All of them reported difficulties in certification (Table 10).

### *Suggestions by Farmers*

Suggestions as made by the sample farmers to encourage organic farming are presented in Table 11. All the sample farmers opined that organic farming will spread, if the government. provides subsidies on organic inputs and support for getting certification and marketing the produce. In addition, they suggested that any technical support from the department of agricultural will also be quite helpful for them. As a whole, the farmers felt that it is in the hands of government to encourage organic farming on a wider scale.

## Conclusions

Overall, the study found that organic farming is more profitable for farmers, in terms of costs and returns, than chemical farming. However, the variation in profits is smaller for small farmers of redgram and large farmers of groundnut. This improved profitability of organic farmers in the present study is despite the fact that these farmers (N=350) are not reaping a premium price for their produce since they are not certified organic and their produce is sold undifferentiated in the market, that is, it is sold without labelling and at 'normal' prices. An analysis of the farmers' perception of organic farming reveals that electronic media (mostly television agricultural programmes presented in the local language) is the prime motivator for them to adopt this method and all the organic farmers in the sample have been practicing this method for over six years. Organic farmers believed that organic farming improves soil fertility and their profits in the long run. They expressed the view that the certification process is very difficult and expensive. Certification would allow them to potentially sell their produce at a premium price. Organic farmers indicated that government support services are needed for marketing their produce through special markets and that targeted support services and awareness programmes would be welcomed.

### *Policy Suggestions*

There is a role for governments in motivating farmers to convert to organic farming. Some of the suggestions for expansion of organic farming are:

- Creation of separate 'green channels' for marketing of organic foods.
- Announcement of premium prices for organic staple food crops in advance of crop season.
- Creation of demand by more consumer awareness programmes.
- Provision of input/conversion subsidies for encouraging organic growers.
- Investment of more funds on research and development on organic farming.
- Initiation of cheaper and quicker certification processes for organic producers.
- Farmers in the study area reported that they are not getting any assistance either from the Agricultural Department or from other government agencies. As such, the intervention of NGOs is very much needed in this regard.

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