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# Higher Employment and Income Potential of Horticultural Crops

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Increased foodgrain production and meeting minimum nutritional standards are the main issues facing the planners and policy makers. Substantial increase in foodgrain production from 50 million tonnes to around 195 million tonnes in four decades is a noted achievement of the country. In order to provide the required vitamins and minerals in the regular diet of the growing population, greater emphasis needs to be laid on the production of horticultural crops, particularly fruits and vegetables (Uppal, 1995). India has diverse and varied agro-climatic conditions, i.e., temperate to tropical to even arid, which are highly favourable and conducive to the production of horticultural crops with required success (Chadha, 1994; Uppal, 1995).

Presently an area of 14 million hectares accounting for 7 per cent of the cultivated area is under horticultural crops which contribute 18 to 20 per cent of gross value of agricultural output (Chadha, 1994; Uppal, 1995). India has emerged as the leading country in the production of fruits surpassing Brazil and occupied second position in the production of vegetables (Ghosh, 1995). During recent years, a quantum jump in the productivity of fruits and vegetables was achieved, i.e., 150 per cent in banana, four-fold increase in tomato, three-fold increase in chilli, etc. (Ghosh, 1995; Pandey, 1994 and Swarup, 1994). In spite of the impressive performance in certain fruits and vegetables, their per capita consumption remained at 46 grams even though the Indian Council of Medical Research recommended 92 grams. Institutions like National Horticultural Board, National Dairy Development Board and Agricultural and Processed Food Products Export Development Authority and Fruits Products Order gave a major thrust to improved production, marketing, and also export of horticultural crops which have definite advantages over traditional field food crops (Ghosh, 1995; Pandey, 1994; Singh, 1994; Swarup, 1994). An attempt is made here to compare the employment potential and profitability of selected horticultural crops with a few traditional field crops and bring out the possibilities of development of horticultural crops in the future.

## *Data and Methodology*

Three districts of Rayalaseema region in Andhra Pradesh, i.e., Chittoor, Cuddapah and Kurnool constituted the study area. The selection of the districts was primarily based on the maximum area under the selected crops for study, i.e., mango (Rani, 1996) and field crops (1994-95), vegetables (1993-94) (Padmalatha, 1995) and flowers (1988-89) (Reddy, 1990) in Chittoor district, papaya (1993-94) (Reddy, 1995) in Cuddapah district, and banana (1994-95) (Shyamaladevi, 1996) in Kurnool district. These studies conducted by the M.Sc. (Ag.) students formed the sources of data. Two mandals in each district and two villages in each mandal for each crop were selected based on the maximum area under the selected crops. Sixty (vegetables and flowers) to eighty (fruits and field crops) respondent farmers

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were randomly selected from different size-groups of farms. The data were collected through personal interview with the help of specially designed schedules. Suitable changes in the operations, prices and wages were incorporated for having comparability of the economic aspects of different crops.

*Employment Potential*

The data on human labour employment in horticultural crops and field crops are presented in Table 1. The highest number of man-days of employment was observed in the flower crops, i.e., jasmine and crossandra with 1210 and 913 man-days. Continuous requirement of human labour for picking flowers over a period of three to four months contributed to higher labour use. Higher labour employment of over 300 man-days for jasmine over crossandra was mainly responsible for the relatively increased yield of around 2.3 tonnes. Among the fruit crops, papaya needed higher employment of human labour of 704 man-days compared to other fruit crops not only due to higher yield of 120 tonnes but also due to continuous harvest of fruits throughout the year. Banana required only half of labour used on papaya. The use of 329 man-days of labour on banana was mainly due to weeding and earthing up operations. Among the vegetables, brinjal required higher man-days of 439, followed by lady's finger (*bhindi*) with 314 man-days and tomato with 236 man-days respectively. Higher yields (see Table 3) were responsible for variations in labour employment. Labour employment on field crops which ranged from 285 man-days on sugarcane to 104 man-days on groundnut was comparatively low with the exception of mango crop. The number of field operations carried on mango is generally less and the labour employed during the period of five years of establishment was distributed over 40 years of bearing time.

Among the various field operations, harvesting accounted for the maximum labour employment of 524 man-days on crossandra and for a minimum of 22 man-days on banana, constituting 57.35 per cent and 6.71 per cent respectively of the total labour employment. Higher yields and continuous harvesting distributed over a few months contributed to higher labour use. Weeding and other intercultural operations accounted for the second position in labour use accounting for a maximum of 29.47 per cent and a minimum of 11.35 per cent of the total labour employment on banana and brinjal respectively. Irrigation occupied third position with the exception of banana and mango. Watch and ward ranked first in labour use in the case of mango as the crop produce has to be protected from theft for a period of 3 to 4 months.

*Cost Structure*

The per hectare cultivation costs (operational and fixed costs) of the crops are presented in Table 2. It may be noted that the expenses incurred on banana were the highest, being Rs. 46,489 per hectare, followed by jasmine with Rs. 41,066 and papaya with Rs. 40,415. The total costs were the lowest on groundnut (Rs. 14,521), followed by mango (Rs. 15,068). Among the crops, investments were higher on fruit crops with the exception of mango, followed by flowers, vegetables, and lastly on field crops with the exception of sugarcane. The establishment costs for perennial fruit crops like mango (40 years), and papaya (3 years)

TABLE 1. HUMAN LABOUR REQUIREMENT

*(man-days/ha)*

| Operations | Horticultural crops | | | | | | | | Field crops (1994-95) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruit crops | | | Vegetable crops (1993-94) | | | Flower crops (1988-89) | | | | |
| (1) | Banana (1994-95) (2) | Papaya (1993-94) (3) | Mango (1994-95) (4) | Tomato (5) | Lady's finger *(bhindi)* (6) | Brinjal (7) | Crossandra (8) | Jasmine (9) | Paddy (10) | Sugarcane (11) | Groundnut (12) |
| Preparatory cultivation | 6.64 (2.01) | 23.25 (3.30) | 1.32 (1.25) | - | - | - | - | - | - | - | - |
| Ridges, furrows and channels | 21.62 (6.56) | - | - | 25.06 (10.62) | 29.95 (9.54) | 29.58 (6.74) | - | - | - | - | - |
| Planting | 17.23 (5.23) | 21.36 (3.03) | 0.54 (0.51) | 16.79 (7.12) | 19.06 (6.07) | 20.18 (4.59) | - | - | 39.70 (22.72) | 40.76 (14.28) | 8.09 (7.73) |
| Manures and fertiliser application | 51.10 (15.51) | 33.66 (4.78) | 3.14 (2.96) | 11.78 (5.00) | 11.47 (3.65) | 13.99 (3.19) | 54.17 (5.93) | 48.13 (3.97) | 9.77 (5.59) | 9.91 (3.48) | 8.79 (8.41) |
| Weeding and earthing up | 97.11 (29.47) | 130.35 (18.52) | 15.79 (14.89) | 39.55 (16.76) | 49.35 (15.70) | 49.82 (11.35) | 136.46 (14.94) | 297.13 (24.55) | 20.85 (11.93) | 53.15 (18.62) | 22.55 (21.56) |
| Propping | 36.16 (10.97) | - | - | - | - | - | 8.19 (0.90) | 55.82 (4.61) | - | - | - |
| Irrigation | 35.41 (10.75) | 64.10 (9.11) | 30.79 (29.04) | 39.09 (16.57) | 38.12 (12.14) | 100.50 (22.90) | 135.35 (14.82) | 130.30 (10.77) | 48.01 (27.48) | 28.38 (9.94) | 4.24 (4.05) |
| Pland protection | 1.10 (0.33) | 6.33 (0.90) | 6.87 (6.48) | 7.70 (3.26) | 8.32 (2.65) | 13.77 (3.14) | 55.37 (6.06) | 175.62 (14.51) | 2.06 (1.18) | - | 1.19 (1.14) |
| Watch and ward | 40.97 (12.44) | - | 31.09 (29.33) | - | - | - | - | - | - | - | - |
| Harvesting | 22.09 (6.71) | 424.90 (60.36) | 16.47 (15.54) | 95.97 (40.67) | 157.82 (50.25) | 211.09 (48.09) | 523.80 (57.35) | 503.11 (41.57) | 54.35 (31.10) | 153.21 (53.68) | 59.73 (57.11) |
| Total | 329.43 (100) | 703.95 (100) | 106.01 (100) | 235.94 (100) | 314.08 (100) | 438.93 (100) | 913.34 (100) | 1,210.11 (100) | 174.74 (100) | 285.41 (100) | 104.59 (100) |

TABLE 2. COMPARATIVE COSTS OF CULTIVATION

*(Rs./ha)*

| Components | Horticultural crops | | | | | | | | Field crops (1994-95) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruit crops | | | Vegetable crops (1993-94) | | | Flower crops (1988-89) | | | | |
| | Banana (1994-95) | Papaya (1993-94) | Mango (1994-95) | Tomato | Lady's finger *(bhindi)* | Brinjal | Crossandra | Jasmine | Paddy | Sugarcane | Groundnut |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Operational costs | | | | | | | | | | | |
| Human labour | 15,147.36 (32.58) | 15,529.83 (38.43) | 1,367.73 (9.08) | 6,735.78 (30.86) | 9,880.25 (45.74) | 12,984.47 (42.42) | 13,700.10 (42.80) | 18,286.55 (44.53) | 4,626.98 (30.28) | 9,057.60 (24.98) | 2,639.00 (18.17) |
| Bullock labour | 343.67 (0.74) | 60.23 (0.15) | - | 1,351.84 (6.20) | 1,387.34 (6.43) | 1,415.06 (4.63) | 178.44 (0.56) | 187.29 (0.46) | 1,451.90 (9.50) | 388.89 (1.07) | 1,581.46 (10.89) |
| Tractor power | 275.07 (0.59) | - | 314.53 (2.09) | - | - | - | - | - | - | 1,166.66 (3.22) | - |
| Seed/planting material | 2,558.80 (5.50) | - | - | 564.43 (2.59) | 583.33 (2.70) | 410.78 (1.34) | - | - | 559.73 (3.66) | 3,313.89 (9.14) | 2,321.48 (15.99) |
| Manures and fertilisers | 10,519.33 (22.62) | 5,359.33 (13.26) | 695.47 (4.62) | 3,046.93 (13.96) | 2,895.53 (8.89) | 3,586.04 (11.71) | 5,219.53 (16.31) | 4,720.29 (11.49) | 2,405.21 (15.74) | 3,830.55 (10.56) | 2,398.63 (16.51) |
| Propping material | 1,428.08 (3.07) | - | - | - | - | - | - | - | - | - | - |
| Electricity and irrigation | 512.54 (1.10) | 476.50 (1.18) | 522.53 (3.47) | 81.24 (0.37) | 80.69 (0.37) | 80.95 (0.26) | 459.05 (1.43) | 379.26 (0.92) | 61.01 (0.40) | 264.33 (0.73) | 52.78 (0.36) |
| Plant protection | 101.90 (0.22) | 65.69 (0.16) | - | 532.05 (2.44) | 598.73 (2.77) | 1,075.72 (3.51) | 3,036.84 (9.49) | 7,682.38 (18.71) | 579.91 (3.79) | 381.67 (1.05) | 218.66 (1.51) |
| Interest on working capital | 2,539.02 (5.46) | 2,506.27 (6.20) | 499.93 (4.98) | 165.11 (0.75) | 237.09 (1.10) | 681.24 (2.22) | 1,732.20 (5.41) | 2,396.28 (5.84) | 307.64 (2.01) | 1,415.17 (3.90) | 175.39 (1.21) |
| Marketing costs and transporting | - | - | 1,266.54 (8.40) | - | - | - | - | - | 159.93 (1.50) | 2,180.74 (6.01) | 142.27 (0.98) |
| Sub-total | 33,425.77 (71.88) | 23,997.85 (59.38) | 4,666.73 (30.96) | 12,477.38 (57.16) | 15,662.96 (72.52) | 20,234.26 (66.09) | 24,326.16 (76.00) | 33,652.05 (81.95) | 10,152.31 (66.43) | 21,999.50 (60.66) | 9,529.67 (65.63) |

*(Contd.)*

TABLE 2 *(Concld.)*

| Components | Horticultural crops | | | | | | | | Field crops (1994-95) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | Fruit crops | | | Vegetable crops (1993-94) | | | Flower Crops (1988-89) | | | | |
| | Banana (1994-95) | Papaya (1993-94) | Mango (1994-95) | Tomato | Lady's finger *(bhindi)* | Brinjal | Crossandra | Jasmine | Paddy | Sugarcane | Groundnut |
| (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) | (9) | (10) | (11) | (12) |
| Fixed costs | | | | | | | | | | | |
| Land revenue | 41.46 | 12.50 | 25.00 | 7.45 | 7.37 | 7.46 | 45.00 | 45.00 | 3.43 | 14.34 | 2.70 |
| | (0.09) | (0.03) | (0.17) | (0.03) | (0.03) | (0.02) | (0.14) | (0.11) | (0.02) | (0.04) | (0.02) |
| Rental value of land | 9,787.80 | 9,000.00 | 9,022.00 | 7,890.67 | 4,414.05 | 8,897.89 | 3,566.13 | 4,228.58 | 3,931.19 | 10,222.92 | 3,980.30 |
| | (21.05) | (22.27) | (59.88) | (36.15) | (20.43) | (29.07) | (11.14) | (10.29) | (25.72) | (28.19) | (27.41) |
| Depreciation | 981.48 | 2,018.00 | 282.00 | 406.09 | 479.42 | 424.27 | 326.58 | 492.70 | 204.95 | 744.54 | 169.41 |
| | (2.12) | (4.49) | (1.87) | (1.87) | (2.22) | (1.39) | (1.02) | (1.20) | (1.34) | (2.05) | (1.17) |
| Interest on fixed capital | 2,252.24 | 1,782.90 | 762.00 | 382.08 | 379.93 | 382.54 | 395.33 | 640.03 | 990.12 | 3,283.95 | 838.84 |
| | (4.84) | (4.41) | (5.06) | (1.75) | (1.76) | (1.25) | (1.24) | (1.56) | (6.48) | (9.06) | (5.78) |
| Repairs and maintenance | - | 920.00 | - | 662.71 | 655.75 | 664.20 | - | - | - | - | - |
| | | (2.28) | | (3.04) | (3.04) | (2.18) | | | | | |
| Annual establishment cost | - | 2,683.80 | 310.00 | - | - | - | 3,347.19 | 2,007.78 | - | - | - |
| | | (6.64) | (2.06) | | | | (10.48) | (4.89) | | | |
| Sub-total | 13,062.98 | 16,417.20 | 10,401.00 | 9,349.00 | 5,936.52 | 10,376.36 | 7,680.23 | 7,414.09 | 5,129.69 | 14,265.75 | 4,991.25 |
| | (28.10) | (40.62) | (69.04) | (42.84) | (27.48) | (33.91) | (24.00) | (18.05) | (33.57) | (39.34) | (34.37) |
| Total | 46,488.75 | 40,415.05 | 15,067.73 | 21,826.38 | 21,599.48 | 30,610.62 | 32,006.39 | 41,066.14 | 15,282.00 | 36,265.25 | 14,520.92 |
| | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) | (100) |

and flower crops like jasmine (12 years) and crossandra (6 years) were apportioned and included in the annual fixed costs. They were as high as Rs. 3,347 for crossandra and Rs. 2,684 for papaya due to shorter period of crop stand compared to Rs. 310 for mango and Rs. 2,008 for jasmine respectively.

Of all the operational costs, human labour constituted the major cost component, accounting for the highest share on all crops with the exception of mango. The share ranged from 45.74 per cent on lady's finger (*bhindi*) to 18.17 per cent on groundnut. The amounts spent on human labour were high on flowers, vegetables with the exception of tomato, followed by fruits and then field crops. Costs on manures and fertilisers formed the second most important cost component with highest amount of Rs. 10,519, accounting for about 23 per cent on banana and the lowest on mango with Rs. 695 only, accounting for 4.62 per cent of the total cost. High doses of manure and fertiliser application are essential for banana which is more responsive to fertiliser and it is also an exhaustive crop.

*Yields, Returns and Benefit-Cost Ratios*

The yields per hectare of fruit crops were comparatively higher than those of the vegetable, flower and field crops as indicated by the data in Table 3. Among the vegetable crops, brinjal yield was about 294 quintals compared to 152 quintals of tomato and 142 quintals of lady's finger (*bhindi*). The yield of jasmine was 5,250 kg which is much higher than that of crossandra with 2,940 kg. Land productivity considerably increased with the cultivation of fruit crops, followed by vegetable and flower crops compared to field crops with the exception of sugarcane which yielded higher than the flower crops.

TABLE 3. YIELDS, RETURNS AND BENEFIT-COST RATIOS

| Crop | Yield/ha | Gross returns (Rs./ha) | Net returns (Rs./ha) | Benefit-cost ratio |
|---|---|---|---|---|
| (1) | (2) | (3) | (4) | (5) |
| Banana (bunches) | 2,050.00 | 98,571 | 52,082 | 1.12 |
| Papaya (ton) | 120.37 | 1,22,713 | 82,298 | 2.04 |
| Mango (ton) | 9.44 | 30,807 | 15,739 | 1.04 |
| Tomato (qtl) | 151.74 | 31,563 | 9,737 | 0.45 |
| Lady's finger (*bhindi*) (qtl) | 141.91 | 34,600 | 12,999 | 0.60 |
| Brinjal (qtl) | 293.82 | 62,252 | 34,641 | 1.13 |
| Crossandra (kg) | 2,940.58 | 46,232 | 14,226 | 0.44 |
| Jasmine (kg) | 5,250.42 | 65,279 | 24,213 | 0.59 |
| Paddy (qtl) | 45.39 | 17,530 | 2,248 | 0.15 |
| Sugarcane (ton) | 10.50 | 40,892 | 4,626 | 0.13 |
| Groundnut (qtl) | 22.30 | 16,810 | 2,289 | 0.16 |

Gross returns were higher for papaya (Rs.1.23 lakhs), followed by banana with Rs. 98,571, jasmine with Rs. 65,279 and brinjal with Rs. 62,252. Of the three vegetable crops, gross returns from brinjal were considerably higher than lady's finger (*bhindi*) (Rs. 34,600)

and tomato (Rs. 31,563) mainly due to higher yield (around 100 per cent). Higher gross returns of jasmine could also be attributed to higher yield of 2,310 kg over crossandra. Lower gross returns for paddy and groundnut could be attributed to the lower yields compared to all other crops.

Table 3 also reveals that net returns were higher from the production of fruit, vegetable, and flower crops compared to field crops. Net returns were found to be the maximum from papaya with Rs. 82,298 compared to other fruit and all other crops, followed by Rs. 52,082 from banana. Brinjal gave the next highest net returns of Rs. 34,641 compared to Rs. 12,999 from lady's finger (*bhindi*) and Rs. 9,737 from tomato even though the cultivation costs of brinjal were higher by around Rs. 9,000 over other vegetable crops. In spite of higher cultivation costs of Rs. 9,000, jasmine contributed to higher net returns of Rs. 24,213 which is higher by around Rs.10,000 over crossandra. Higher cultivation costs and lower yields contributed to lower net returns from field crops compared to all horticultural crops.

Horticultural crops showed higher benefit-cost ratios compared to field crops (Table 3). The benefit-cost ratio was the highest at 2.04 for papaya due to higher yields and returns. Fruit crops revealed higher benefit-cost ratios, followed by vegetable and flower crops and lastly field crops. Next to fruit crops, brinjal had higher benefit-cost ratio of 1.13, followed by lady's finger (*bhindi*) with 0.60, and tomato with 0.45. Among the two flower crops, jasmine showed a higher benefit-cost ratio of 0.59 than crossandra (0.44). The benefit-cost ratios were the lowest for field crops and the highest being 0.16 for groundnut. Lower yields and higher production costs due to intensive and continuous cultivation were mainly responsible for lower benefit-cost ratios.

*Conclusion*

Horticultural crops like fruits, vegetables, and flower crops have higher employment potential compared to field crops, which is mainly due to spreadover of the harvesting period in the case of flowers and vegetables. Land productivity is considerably higher resulting from the high yield performance of horticultural crops, Higher gross and net returns can be obtained from fruit, flower, and vegetable crops. The lower investment costs and higher yields from them have resulted in favourable benefit-cost ratios.

A wide range of agro-climatic conditions are highly favourable to the production of horticultural crops in India. Certain fruit crops like custard apple, jamoon, ber, cashew, wood apple, etc., grow very well even in less fertile and marginal lands. They are highly suitable for the development of waste lands . They require relatively low investments compared to field crops and their production problems are also much less in addition to having great export potential. Developments during this decade in terms of quantum jump in yields of tomato, chillie, banana, etc., and institutional thrust in exploiting the export potential clearly reveal the great future for the growth of horticultural crops.

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