

Chapter 8 - Cost of cultivation and profitability of CF and NCF

8.1.Introduction

Contract farming would be sustainable from farmers' perspective if it enhances its profits and reduces its risks and uncertainty. Thus, the farmer would continue to remain in the contract provided that contracting would provide him better returns than alternative markets (Barrett et al., 2012). It is important to know whether growing the CGP or onion under contract is profitable compared to without contract. This chapter helps us in understanding the cultivation and profitability aspects of CF and NCF for CGP and onion. Productivity, input-use pattern, costing analysis, gross and net returns, benefit-cost ratios per unit of land for CF and NCF of CGP and onion in sample regions is presented. Section 8.2 presents the methodology and data limitations. Section 8.3 examines the costs, input-use pattern, and returns from CGP and onion cultivation respectively. Section 8.4 synthesises the results.

8.2.Methodology

Economic analysis measuring the productivity, input-use pattern, costing analysis, gross and net returns, benefit-cost ratios per unit of land for CF and NCF of CGP and onion in sample regions was done. There were direct and indirect costs borne by farmers during production as well as the time of marketing the crop. In the thesis, both production and marketing costs have been accounted.

8.2.1. Production costs

Total production costs comprise of fixed and operational costs. Although the cash expenses such as buying of inputs like seeds, fertilizers, plant protection material, etc., are directly observed, but utilization of his fixed assets (like land, machinery, implements, etc.) and owned inputs like family labour (FL) in production are also accounted to give a realistic picture of the total costs incurred. In addition to fixed and operational costs, the cost concepts (Costs A, B, C) used by Commission for Agricultural Costs and Prices (CACP) is presented in this section. Based on the present Comprehensive scheme of CACP cited in Sen and Bhatia (2004), CACP (2012), and

Manual on Cost of Cultivation Surveys (CSO, 2008) various cost concepts calculated are explained in Figure 8.1

Figure 8.1: CACP Cost Concepts

Cost A1 = Value of hired human labour (HL), value of hired bullock labour (BL), value of owned bullock labour, value of owned machine labour (ML), hired machinery charges, value of seed (both farm produced and purchased), value of insecticides and pesticides, value of manure (owned and purchase) value of fertilizers, irrigation charges, depreciation on implements and farm building, land revenue, cesses and other taxes, and interest on working capital
Cost A2 = Cost A1+ Rent paid for leased-in land,
Cost B1 = Cost A1 + interest value of owned fixed capital assets (excluding land)
Cost B2 = Cost B1 + Rental value of owned land (net of land revenue) and rent paid for leased-in land
Cost C1 = Cost B1 + imputed value of family labour
Cost C2 = Cost B2 + Imputed value of family labour
Modified Cost (C2M) = Cost C2 + marketing costs and transportation report

Source: Compiled from Sen and Bhatia (2004, p.96) and CACP (2012)

COST A2 are paid out costs. Operational costs are nothing but deducting depreciation from COST A2. While fixed cost comprises of depreciation, rental value of land, and interest on fixed capital. Apart from productions costs, marketing costs have been included which include expenses such as assembling, grading, packing, local transportation, loading-unloading, transport, and commission and market fees. In addition to costs, corresponding gross returns and net returns were worked out. Gross return is the total value of the output. While net returns per acre of a crop, defined as gross returns per acre minus the total costs per acre, is one of the indicators of profitability.

The details of the computation of specific cost items mentioned in Figure 8.1 are:

- k) HL, BL, ML – valued at the actual rates paid by the farmer.
- l) FL – valued at the rate of wages paid for hired labour for similar work.
- m) BL and ML (owned) – valued at rates paid to hire the same.
- n) Exchange labour & exchange Bullock has been treated as HL & BL respectively.

- o) Seeds (purchased), and irrigation charges – valued at rates paid by the farmers. Irrigation charges include maintenance on irrigations systems and electricity charges, whether paid or unpaid and also fuel. For e.g., drip irrigation systems require flushing of a chemical after each season.
- p) Seeds (farm produced), manure (owned) – valued at the prevailing market prices
- q) Chemical Fertilizer – Fertilizers are evaluated at the purchase price including the transport charges.
- r) Cost of insecticides and pesticides (plant protection kit) – It is evaluated at the purchase price. Physical input such as fuel used for application for plant protection kit has been included under the plant protection kit category.
- s) Expenses incurred on getting Farm yard manure (FYM) to field, for e.g., HL, FL, ML, and BL has been included under the respective labour categories of land preparation category.
- t) Miscellaneous and overhead charges – expenses incurred on bringing seeds from collection centre to farm/home. Expenses on maintenance and repair of implements if any is included in this category
- u) Rental value of own land – Farmers were asked a hypothetical question that if they had given the plot of land where the reference crop was sown, and for the crop duration, and how much rent you would have received? In some cases farmer was unaware about lease rates, then the rental value of owned land has been set at a rate similar to what other people in the area are charging for the type of land owned by the farmer.
- v) Depreciation - is calculated for assets which were utilized for reference crop cultivation. Depreciation was calculated by the straight-line method $[(\text{Purchased value} - \text{Scrap value}) / \text{Life span}]$. Details regarding how the depreciation has been apportioned for particular asset is explained below:
 - i. Bullock cart: Assets such as bullock cart were excluded from the calculation of depreciation and repair. The reason being as it was observed during the field survey and also mentioned in Panse (1954) that bullock

carts are used mainly for transportation and not directly for crop production.

- ii. Agricultural machinery - It was observed that only handful of farmers owned tractors and its associated machinery, and STP sprayer within the village. These farmers used it for custom hiring purpose and was a source of revenue for them. Moreover, in our survey, the prevailing custom hiring rates have been imputed, for those who owned these machinery and thus no further estimations like depreciation, repairs, and interest on fixed capital were apportioned⁴¹. While the assets such as hand sprayer or petrol sprayer used for spraying plant protection chemicals have an average life of 10 years and are used on other crops as well. Moreover, they are borrowed and used by other fellow farmers. Thus, it is cumbersome to calculate the exact share of depreciation for the reference crop. Also, this depreciation amount was very small. Hence, depreciation and interest on fixed costs have not been calculated for hand sprayer or petrol sprayers.
- iii. Electric motor/ diesel pump - It was observed that mostly more than one crop is grown on a farm and moreover, the farmer may have more than one electric motor. Thus, depreciation for the electric motor is charged to the reference crop acreage in proportion to the GCA.
- iv. Drip/Sprinkler Irrigation system: While depreciation for the irrigation system is carried as per the proportion of irrigation system applied to reference crop in the proportion of irrigation system to GCA. The estimated life of drip and sprinkler irrigation system for onion growers is estimated to be seven years and ten years, with the salvage value of 12.5% and 10% respectively of the purchase price. Whereas estimated life of drip and sprinkler irrigation system for CGP growers is estimated to be ten years with the salvage value of 10% respectively of the purchase price⁴².

⁴¹ According to Agrawal (1961), if the item is just a negligible percentage of total cost, but involves too much calculation in arriving at its actual cost, then it is desirable to follow a simpler procedure although less perfect in evaluating such an item. As the amount were so small compared to total cost of production, custom hiring rates in case of valuation of bullock and machine labour are accounted.

⁴² The number of irrigations and water consumption is high among cotton and onion compared to potato (INCID, 1994; Narayanamoorthy, 2004). Based on the discussion with irrigation suppliers and farmers as

- w) Interest on working capital is charged at 12% per annum for half the crop duration (applicable for both the crops).
- x) Interest on Fixed Capital on electric/diesel pump and drip and sprinkler irrigation systems is charged @10% per annum to the reference crop in proportion to the acreage for which irrigation system was used in the agricultural year. While interest on electric/diesel pump was calculated in proportion of the reference crop to the GIA.

8.2.2. Marketing Costs

Marketing Costs include expenses incurred on physical inputs (gunny bags for packing or other inputs used while storage); FL, HL related to packing, loading and also in case of onion NCF has gone to APMC market for sale, as that requires a day commitment; APMC charges (commission and market fees) and transportation costs. Transportation costs incurred during storage (if any), farm to firm's collection centre (in case of some CGP CF) or firm's plant (in case of onion), from farm to APMC Market have been accounted.

8.2.3. Gross Value of Output

The actual price at which the farm produce is sold has been used for calculating gross receipts. The unsold stock used for family or bullock consumption has been evaluated at the prevailing farm price during the harvest period. In case if there are marketing costs involved in selling this stock, it has been accounted (Agrawal, 1961). Similarly, Gross output (kgs) for the farm is defined as total sales plus the output of farm produce which was unsold to the company and used for domestic use such as home or cattle consumption or gifted to relatives.

8.2.4 Data Limitations

The cost of cultivation data analysed in this section refers to the data collected by primary survey from the sample CGP farmers for Kharif season 2012-13 and onion for Rabi season 2011-12. The survey was carried out after three-four months of the output harvested and sold. Farmers were encouraged to show or refer to any written records such as bills or receipts of purchases of inputs and sale of selected crops respectively or

well as review of literature, for e.g. (Singh A. , 2008) the life span and salvage value of irrigation system was estimated.

any statement about income and expenditure accounts they had. However, in many cases, farmers relied on recall. The detailed account of costs and returns was obtained using the interview schedule in Appendix B. Data related to prices of inputs were cross-checked wherever possible with respective input dealers. Similarly, output sale data i.e. price and quantity sold was cross-verified by hundekari in case of CGP, and by company staff for onion. In case of onion NCF, the name of APMC market was recorded along with the month of sale. This helped in verifying the price of the crop from the respective APMC, which gives the modal, minimum, and maximum price. Similarly, w.r.t. CGP NCF, to whom they had sold the output was noted, and wherever possible it was cross-checked. This approach enabled wherever possible crosschecks, ensuring that such recall data on costing and sale of output was reliable.

Given that the primary survey was specific to a farmers of particular crop and contracting firm, hence, results of it could not be generalised. Moreover, the analysis of data is from a single season. Therefore, results need to be viewed with caution. However, results do give us the broad understanding and helps to fulfil the objectives of the thesis.

8.3. Results and Discussion

Before presenting the results of production, costs and returns of reference crops, the type of irrigation and seed variety used by CGP and onion growers are discussed. Usage of drip and sprinkler was higher in case of CF and ACF compared to NNCF. Overall, nearly 65% of ACF and 61% of CF had used either drip or sprinkler irrigation for CGP cultivation compared to 31% of NNCF. But in case of onion, only one NCF used drip for onion cultivation, while rest all used flood irrigation. While 85% of CF used flood irrigation, while rest used drip/sprinkler irrigation for onion cultivation (Table 8.1).

Table 8.1: Type of irrigation used for contract crop cultivation (%)

CGP				
Particulars	CF	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
No irrigation	25.8	30.3	32.1	31.5
Flood	13.5	6.1	35.7	24.7
Drip	28.1	24.2	14.3	18.0
Sprinkler	32.6	39.4	17.9	25.8
Total	100.0	100.0	100.0	100.0
Onion				
Particulars	CF	NCF		
		ACF ($n_2=48$)	NNCF ($n_2=44$)	NCF ($n_2=92$)
flood	85.2	100.0	97.7	98.9
drip	4.6	0.0	2.3	1.1
sprinkler	7.4	0.0	0.0	0.0
drip/sprinkler & flood	2.0	0.0	0.0	0.0
Total	100.0	100.0	100.0	100.0

Source: computed from primary survey

Note: Units in percentage and have been calculated on column sums

Table 8.2 shows the seed variety grown by farmers. In case of CGP, 53% and 30% of CF had grown FI-1533 and ATL variety of CGP respectively. While rest 17% of CF had grown both ATL and FL-1533. On some part of the land, farmers prefer to grow ATL. In the case of onion all the CF had had grown V12 variety, while 60% and 40% of NCF had grown Rangda onion and table variety white onion respectively.

Table 8.2: Seed Variety grown by farmer

CGP				
Crop variety	CF	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+n_3=89$)
1533	89.9	46.9	57.1	53.4
ATL	4.5	18.8	35.7	29.5
1533 and ATL	5.6	34.4	7.1	17.0
Total	100.0	100.0	100.0	100.0
Onion				
Crop variety	CF	NCF		
		ACF ($n_2=48$)	NNCF ($n_2=44$)	NCF ($n_2=92$)
V12	100.0	0.0	0.0	0.0
White onion	0.0	45.8	34.1	40.2
Rangda	0.0	54.2	65.9	59.8
Total	100.0	100.0	100.0	100.0

Source: computed from primary survey

Note. Units in percentage and have been calculated on column sums

8.3.1. Production costs

In this section, the details about various aspects of cost of production and marketing of CGP and onion is explained. Weighted average production and marketing costs and net returns for CGP and onion growers is presented in Tables 8.5 and 8.6. Total production costs of an acre of CGP is 6% higher in CF, Rs.50,411 compared to Rs.47,571 for NCF. Total production costs comprise of fixed and operational costs. Similarly, operational and fixed costs were 1% and 6% higher in CGP CF compared to NCF. While marketing cost were very less incase of CGP compared to onion. This is mainly because both contracting firm and the non-contracting firm were procuring harvests mostly from farmers' field. Also, transportation costs were borne by respective firms. In the case of onion, NCF had to take the produce to the APMC. Which involved marketing and APMC charges w.r.t. sale of output. In the following sub-sections, different production aspects are discussed.

8.3.1.1. Material inputs

CGP CF farmers used to buy most of the input materials such as seed tubers, plant protection material except fertilizers from Company's hundekari. The majority (58%) of the NCF had bought seeds also from other than company hundekari, while one-third bought from Company hundekari itself. Within NCF, 55% of ACF and 22% of NNCF had bought from company hundekari, whereas 30% of ACF and 75% of NNCF had bought from other hundekaris (Table 8.3). Whereas three-fourth of NNCF farmers had bought seeds from other hundekari. This shows that although ACF grew CGP without a contract, they were still associated with company hundekari with regard to purchasing seeds and sale of output, while NNCF were associated with other hundekaris for the same.

About 93% of CF had taken a bank loan to pay for material inputs (seeds, fertilizers, plant protection kit) for CGP cultivation while rest had paid through Bank Demand draft. Three-fourth of ACF and half of NNCF had bought material inputs either on partly or fully credit from the hundekaris. While 15% of ACF and 38% of NNCF had bought material inputs on cash. Thus, the majority of the NCF grew CGP based on the purchase of materials inputs on credit.

Table 8.3: From where did NCF CGP growers purchased seeds from?

Particulars	NCF		
	ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+ n_3=83$)
Company hundekari	55	22	34
Other hundekari	30	75	58
Both company and other hundekari	6	0	2
Self	9	4	7
Total	100.0	100.0	100.0

Source: Primary survey

Units in percentage and have been calculated on column sums

Table 8.4: Purchase terms for buying seeds, CGP NCF

Particulars	CF ($n_1=89$)	NCF		
		ACF ($n_2=33$)	NNCF ($n_3=56$)	NCF ($n_2+ n_3=83$)
Bank crop loan	93	6	2	3
Cash/bank DD	7	15	38	30
Partly credit	0	55	36	43
Full credit	0	18	21	21
Self-produced	0	1	4	3
Total	100.0	100.0	100.0	100.0

Source: Primary survey

Note: Units in percentage and have been calculated on column sums

The PepsiCo hundekaris from Pune also sell CGP seed tubers other than that of contract. About 39% of CF grew CGP in addition to contract acreage of which 80% were from Pune. The major reason for the CF growing CGP in addition to contract is that often, the price offered by other traders is higher compared to the contract price. The incidence of growing CGP in addition to contract is high in Pune because CF is going around in sample villages of the district for around 10 years. Moreover, the presence of outside traders and firms are high in Pune compared to Satara district. The PepsiCo hundekaris as well as other non-company hundekaris, source the seed tubers from Punjab. Those growing CGP without a contract or even CF if they bought seed tubers on cash payment they would get it as per the contract seed tuber price. Those who bought on half and full credit had to pay Re. 1 and Rs. 2 per kg respectively in addition to contract seed tuber price.

Material input costs were high among both CGP and onion CF compared to NCF. Seed cost contributes over 35% of total cost in case of CGP, which is substantial. Material input costs were higher in CGP CF as they spent a larger amount on seeds, plant-protection measures, and manures (Table 8.5). While Onion CF spent a higher amount on fertilizers and plant-protection measures (Table 8.6).

The weighted average seed cost per acre of CGP CF was Rs. 18,369 was slightly higher compared to that of NCF, which was 17,682. This is mainly because, 90% of CF and 53% of NCF used FL-1533 variety exclusively, which is priced Rs. 23/kg in contract and Rs. 24-25/kg without a contract. While rest used ATL variety which is priced Rs. 20 in the contract and around Rs. 20-22 in without a contract. ATL was preferred by farmers in Visapur village, Khatav taluka, as it was yielding good results. The unweighted average seed costs per acre of CF and ACF were similar, while that of NCF were lower (Table 8.7).

In the case of onion, V12 seed cost is Rs. 700. Of which CF has to pay Rs. 600 and Rs. 100 is deducted from final payment. For one acre, 3-4 kg seeds are required. Thus, the cost of seeds for an acre cultivation is not very high. While NCF buys seed which is available on any agriculture store. Within NCF, seed costs were similar for both ACF and NCF (Table 8.7)

8.3.1.2. Labour costs

Human labour (both FL and HL), were similar for CGP. Most of the CGP farm households (96%) used exchange labour. Overall, for both crops, it was found total production labour costs do not significantly differ from each other. However, in the case of onion, hired labour for cultivation was significantly higher in CF compared to NCF at 10% level of significance. This was mainly because as due to higher yields, more farm labour is needed. Also, average weeding hired labour costs was higher for CF was Rs. 1,689 compared to Rs. 1,434 for onion NCF and it was significantly different from each other at 5% level of significance. Overall, onion contract farming seems to have a positive impact on rural employment in the region.

The average bullock labour costs for CGP were higher in case of NCF compared to CF, while for machine labour it was vice-versa. This shows that CGP CF farmers were inclined to use modern technology. Some of CF in Satara had used potato harvesters for harvesting CGP output, while NCF had mostly relied on bullock labour for the same. As per Table 8.7, unweighted average bullock labour was similar for CF and ACF, while it was higher in case of NNCF. This shows that it is NNCF which relies on traditional practices of cultivation.

On an average total operational costs of CF was significantly higher ($p < .01$) than that of NCF for both the crops. On average, total operational costs of CGP CF were Rs.

44,486 compared to Rs. 41,709 of NCF. While average total operational costs of onion CF were Rs. 29,468 compared to Rs. 26,881 of NCF. Total operational costs constituted around 85% of both CGP CF and NCF. While in case of onion, operational production costs constituted around 75% and 66% of total costs CF and NCF respectively.

8.3.1.3. Fixed costs and other costs

Overall fixed production costs accounted for around 12% of the total costs. The fixed costs were significantly not different for CF and NCF among both the crops. Of the fixed costs, the rental value of owned land was the major constituent. In case of onion, the rental value of owned land costs was significantly not different for CF and NCF. However, in case of CGP, NCF had a significantly higher rental value of owned land compared to CF, suggesting that NCF had a better quality of land or due to a locational aspect. In fixed costs for CGP, depreciation and interest on fixed costs were higher for CF, but these constituted a marginal percentage of the total costs.

8.3.2 Marketing Costs

The marketing costs did not make a difference in case of CGP, as the marketing channel was similar, i.e., both for CF and NCF it was sold via an intermediary and mostly truck used to come on the farm for procuring the produce. However, for onion, marketing channels were different, as CF used to sell it directly to JISL, with the Jain Sevak making arrangements to procure from the farm directly. While most of the NCF had to take produce to APMC, incurring substantial marketing costs. As marketing costs of onion, NCF constituted 21% of total costs compared to 12% of onion CF. Onion NCF had to incur extra marketing costs with respect to labour, material inputs, and APMC charges. NCF had to spend on gunny bags as well as on storage material. While for CF, gunny bags was provided by the company and they had to sell produce immediately after harvest, thus no storage costs were involved.

8.3.3. Total Costs

Overall, total costs per acre was not significantly different for both the crops. For CGP weighted average total costs per acre was Rs. 52,331 for CF and Rs.49,680 for NCF. While for onion, weighted average total costs per acre was Rs. 39,623 for CF and Rs.40,497 for NCF.

Different cost concepts discussed in Figure 8.1, its results for CGP and onion are presented in Table 8.8: Weighted average cost of cultivation and returns (cost concepts) Table 8.8. Costs A2, B1, B2, C1, C2, and C2M were significantly higher in CF compared to NCF, with percentage change being in the range of 5-8%. Although costs of CF were higher, but the net returns over Costs A2, B1, B2, C1, C2, and C2M were significantly not different between CF and NCF. This suggests that either yield and/or price was higher in the contract.

8.3.4. Yields

Yields were significantly higher in CF compared to NCF for both the crops (Tables 8.5 and 8.6). The weighted average physical yield obtained by CGP CF was 44.6 quintals per acre, which was 18% higher of yield of 37.7 quintals per acre in NCF. Similarly, for onion, weighted average yield in CF was 91.4 quintals, which was 16% higher of yield of 78.8 quintals per acre in NCF. This, shows that contract production has resulted in higher yields. The results are in line with the literature viz. Awotide et al. (2015); Cai et al. (2008); Narayanan (2011); and Swain (2011). Due to higher yields in CGP and onion CF resulted in per quintal total costs are lower over NCF, though the per acre costs are higher. Also cost average cost per kg of CGP was Rs. 16.8 compared to Rs. 13.8 that of both CF and ACF. As stated in Dev and Rao (2007, p. 42), “*economic theory states that the average costs matter in decision-making and deciding the profitability rather than absolute costs*”.

One of the reasons for higher yields is that the CF had spent higher money on material inputs (seeds, fertilizers, plant protection kit) so that they get good yields. Also, CF had access to extension services.

One of the point to note is that in case of CGP, many of the farmers had stored part of produce and by the time they had sold, some part had got spoiled, therefore not all harvested output was sold. Similar was the case of NCF onion. Thus, the marketable surplus was less than marketed surplus. While for CF, JISL used to pay only for 97.5% of produce. This is perhaps the reason that when total yield is multiplied by average selling price, the value is greater than that of gross returns.

8.3.5. Net returns

Net returns matter in deciding which crop to grow and under which governance mode (CF or NCF). Net returns over different cost concepts for CGP and onion are presented in Table 8.8. Average selling price of CGP CF for the reference season was Rs. 11.8 per kg, which was 19% lower compared to NCF. This is mainly because Pepsico commanded a price leadership position. Thus, the non-contracting firms had to pay more than the PesiCo price, in order to entice farmers to sell to them. Thus, NCF fetched a higher price. This resulted in average NCF net returns (i.e., deducting production and marketing costs from gross returns) of Rs. 1,047 per acre, while that for CF was a loss of Rs. 2,443. However, this return was significantly not different from each other. The average selling price per kg in case of CGP CF could easily cover the Cost C1 and fall short of Cost C2 with a small margin of Rs. 523. But NCF were able to cover all the imputed costs along with paid-up costs (production and marketing) at their average selling price per kg.

Average selling price of onion CF for the reference season was Rs. 4.8, which was 21% higher compared to NCF. Thus, CF fetched both the higher price and yields. This resulted in average CF net returns (i.e., deducting production and marketing costs from gross returns) of Rs. 3,230 per acre, while that for NCF was a loss of Rs. 8,737 per acre. This result was significantly higher at 1% level of significance. The average price per kg in case of onion, NCF could easily cover the Cost C1 and fall short of Cost C2. But onion CF were able to cover all the imputed costs along with paid-up costs (production and marketing) at their average selling price per kg (Table 8.8).

Table 8.5: Weighted average production, marketing costs and net returns, CGP (Rs./acre)

Cost Items	CF		NCF		<i>t</i> -test
	CF	% of total cost	NCF	% of total cost	<i>p</i> value (2-tailed)
Production Cost					
Human Labour Cost					
Hired labour	2,465	4.7	2,664	5.4	.30
Family labour	1,887	3.6	1,921	3.9	.94
Sub-total Human labour	4,352	8.3	4,584	9.2	.11
Bullock labour**	2,426	4.6	2,863	5.8	.05
Machine labour**	2,351	4.5	1,909	3.8	.01
Material Input					
Seed**	18,369	35.1	17,682	35.6	.05
Manure	4,883	9.3	3,688	7.4	.26
Fertilizer	5,780	11.0	5,736	11.5	.42
Plant protection*	5,379	10.3	4,363	8.8	.00
Sub-total material inputs*	34,410	65.8	31,468	63.3	.00
Irrigation charges**	240	0.5	140	0.3	.01
Miscellaneous expenses	149	0.3	196	0.4	.95
Interest on working capital	559	1.1	547	1.1	.92
Total Operational Costs*	44,486	85.0	41,709	84.0	.00
Depreciation*	555	1.1	243	0.5	.00
Rental value (own land)*	4,716	9.0	5,316	10.7	.00
Interest on fixed capital*	654	1.2	304	0.6	.00
Fixed Cost	5,925	11.3	5,862	11.8	.66
Total Production Costs (a)	50,411	96.3	47,571	95.8	.00
	Marketing and Storage				
Material Inputs	690	1.3	640	1.3	.15
Human Labour	896	1.7	853	1.7	.25
Transport and APMC	334	0.7	415	1.2	.11
Sub-total marketing cost (b)	1,920	3.7	2,109	4.2	.36
Total Cost (a+b)*	52,331	100.0	49,680	100.0	.00
Yield (quintals/acre)*	44.6		37.7		.00
Total cost per kg	11.7		13.2		.44
Average price*	11.8		14.6		.00
Gross Return (c)	49,888		50,727		.92
Net Return (a+b-c)	-2,443		1,047		.17

Note: For each row, the last column presents the results of a *t*-test of the null hypothesis that the means are equal in both samples. **p* < .01, ** *p* < .05, *** *p* < .1

Table 8.6: Weighted average production, marketing costs and net returns, onion (Rs./acre)

Cost Items	CF		NCF		<i>t</i> -test <i>p</i> value (2-tailed)
	CF	% of total cost	NCF	% of total cost	
Production Cost					
Human labour cost					
Family labour	3,785	9.6	3,742	9.2	.90
Hired labour***	7,772	19.6	7,134	17.6	.10
Sub-total Human labour	11,557	29.2	10,875	26.9	.12
Bullock labour	783	2.0	776	1.9	.93
Machine labour	1,822	4.6	1,664	4.1	.65
Material Input					
Seed	2,623	6.6	2,459	6.1	
Manure	4,983	12.6	5,131	12.7	.81
Fertilizer*	4,301	10.9	3,093	7.6	.00
Plant protection*	2,463	6.2	2,047	5.1	.00
Sub-total material inputs**	14,370	36.3	12,729	31.4	.03
Irrigation charges	435	1.1	426	1.1	.63
Interest on working capital*	502	1.3	410	1.0	.00
Total Operational Costs**	29,468	74.4	26,881	66.4	.02
Depreciation	94	0.2	35	0.1	.13
Interest on fixed capital	125	0.3	106	0.3	.49
Rental value (own land/lease-in)	4,894	12.4	4,955	12.2	.27
Fixed Cost	5,113	12.9	5,096	12.6	.85
Total Production Costs (a)**	34,581	87.3	31,977	79.0	.02
Marketing and Storage					
Material Inputs*	0	0.0	2,489	6.1	.00
Human Labour***	1,364	3.4	1,526	3.8	.06
Transport**	3,674	9.3	3,033	7.5	.05
APMC & other charges*	3.5	0.0	1,472.2	3.6	.00
Sub-total marketing cost (b)	5,042	12.7	8,520	21.0	.00
Total cost (a+b)	39,623	100.0	40,497	100.0	.52
Yield (quintals/acre)*	91.4		78.8		.00
Total cost per kg	4.3		5.1		
Average price*	4.8		4.0		.00
Gross Return*	42,853		31,760		.00
Net Return *	3,230		-8,737		.00

Note: For each row, the last column presents the results of a t-test of the null hypothesis that the means are equal in both samples. * $p < .01$, ** $p < .05$, *** $p < .1$

Table 8.7: Unweighted average costs and net returns for CF, ACF, and NCF
(Rs./acre)

Particulars	CGP			Onion		
	CF	ACF	NNCF	CF	ACF	NNCF
Production Cost						
Human Labour Cost						
Family labour	1,894	1,771	2,245	3,687	3,452	4,353
Hired labour	2,460	2,522	2,450	7,660	8,112	6,150
Sub-total Human labour	4,354	4,293	4,695	11,347	11,564	10,503
Bullock labour	2,476	2,582	2,995	759	893	755
Machine labour	2,326	1,971	2,038	1,838	1,686	1,538
Material Input						
Seed	18,411	18,238	17,274	2,632	2,438	2,433
Manure	5,011	2,270	4,712	4,962	5,941	4,548
Fertilizer	5,773	5,472	5,964	4,250	3,345	2,879
Plant protection kit	5,390	4,788	4,166	2,445	2,169	1,939
Sub-total material inputs	34,362	31,375	32,118	14,289	13,893	11,799
Irrigation charges	241	202	141	442	411	428
Miscellaneous expenses	147	184	126	--	--	--
Interest on working capital	559	547	564	498	447	370
Total Operational Costs	43,905	40,607	42,113	29,174	28,894	25,394
Depreciation	557	364	254	102	16	43
Interest on fixed capital	669	359	374	132	65	136
Rental value (own land/lease-in)	4,726	5,277	5,046	4,938	4,926	4,951
Fixed Cost	5,953	6,000	5,675	5,171	5,007	5,131
Total Production Costs (a)	49,858	46,607	47,788	34,345	33,901	30,524
Marketing and Storage						
Material Inputs	693	685	610	0	2,762	2,342
Human Labour	900	877	768	1,360	1,674	1,539
Transport	17	13	161	3,680	3,571	2,873
APMC & other charges	321	368	334	3	1,851	1,391
Sub-total marketing cost (b)	1,924	1,886	1,804	5,043	9,857	8,145
Total cost (a+b)	51,782	48,493	49,592	39,388	43,758	38,669
Yield (quintals/acre)	45.0	37.8	34.6	92.0	82.0	74.5
Total cost per kg	13.7	13.8	16.8	4.3	5.3	5.2
Average price	11.8	13.7	14.3	4.8	4.3	3.8
Gross Return	50,453	48,970	46,519	43,094	35,573	29,013
Net Return	-1,328	477	-3,073	3,705	-8,185	-9,656

Source: Computed from primary survey

Table 8.8: Weighted average cost of cultivation and returns (cost concepts)

Particulars	CF	NCF	% change over NCF	Independent sample <i>t</i> -test
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				<i>p</i> value
CGP Cost of cultivation (Rs/acre)				
Cost A1/A2*	43,155	40,031	7.9	.00
Cost A2+FL*	45,041	41,951	7.4	.00
Cost B1*	43,809	40,335	8.7	.00
Cost B2*	48,524	45,650	6.3	.00
Cost C1*	45,695	42,255	8.1	.00
Cost C2*	50,411	47,566	6.0	.00
Cost C2M*	52,331	49,680	5.3	.00
CGP, Net returns over cost (Rs/acre)				
Cost A1/A2	6,734	10,696	-37.0	.13
Cost A2+FL	4,847	8775	-44.8	.14
Cost B1	6,080	10,392	-41.5	.11
Cost B2	1,364	5,076	-73.1	.16
Cost C1	4,193	8,472	-50.5	.11
Cost C2	-523	3,161	-116.5	.16
Cost C2M	-2,443	1,047	-333.3	.17
BC ratio (A2+FL)	1.11	1.21	-8.3	.12
BC ratio (C2M)	0.95	1.02	-6.9	.18
Onion Cost of cultivation (Rs/acre)				
Cost A1*	25,777	23,174	11.2	.01
Cost A2	25,806	23,174	11.4	.01
Cost A2+FL**	29,592	26,916	9.9	.02
Cost B1*	25,931	23,280	11.4	.01
Cost B2**	30,796	28,235	9.1	.02
Cost C1**	29,716	27,022	10.0	.02
Cost C2**	34,581	31,977	8.1	.02
Cost C2M	39,623	40,497	-2.2	.53
Onion, Net returns over cost (Rs/acre)				
Cost A1*	17,075	8,586	98.9	.00
Cost A2*	17,046	8,586	98.5	.00
Cost A2+FL*	13,261	4,844	173.8	.00
Cost B1*	16,922	8,480	99.6	.00
Cost B2*	12,057	3,525	242.1	.00
Cost C1*	13,136	4,738	177.2	.00
Cost C2*	8,272	-217		.00
Cost C2M*	3,230	-8,737		.00
BC ratio (A2+FL)*	1.5	1.2	-8.3	.01
BC ratio (C2M)*	1.1	.78	-6.9	.00

Note: For each row, the last column presents the results of a *t*-test of the null hypothesis that the means are equal in both samples. **p* < .01, ** *p* < .05, *** *p* < .1

8.4. Concluding Remarks

The results of both the crops confirmed that CF had better yields than the NCF. This is mainly due to extension services and access to quality material inputs in contracting. The onion CF had outperformed NCF in all respects (production and

marketing). Although overall costs were higher in CF for both the crops, but they gain in terms of increase in yields, this overall reduces the per quintal costs. The average per quintal costs was higher in onion NNCF compared to CF and ACF. In case of CGP, although net returns over the total cost of CF were negative, while those of NCF were positive, but they were not significantly different from each other. CGP CF could easily cover the Cost C1 and fall short of Cost C2 with a small margin of Rs. 523.

CF also save on marketing costs, which improves their overall profitability. Thus, contracting seems to increase yields, and help farmers reduce their marketing costs. Given the imperfections in input markets in India, contract farming seems to facilitate positive change in the overall agricultural sector.