AN EMPIRICAL ANALYSIS OF THE RELATIONSHIP BETWEEN SIZE, OWNERSHIP & PRODUCTIVITY OF FARMS IN A WATERSHED AREA IN MADHYA PRADESH

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APPROVAL SHEET

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ABBREVIATIONS

SC - Share Croppers

LL - Landlords

PDs - Person Days

t ha^{-1} - Tonnes per Hectare

ha^{-1} – Per Hectare

ABSTRACT

The study examines the land size-productivity relationship and profitability among owner operated and share cropper operated farms growing soybean during the 1999 rainy season in three villages of Vidisha District of Madhya Pradesh. The land size-productivity relationship has been found inverse both for owner operated farms(-0.27) and share cropper operated farms(-0.30). The Productivity of Owner operated farms is marginally higher at 0.72 t ha^{-1} compared to 0.68 t ha^{-1} in share cropper operated farms, among ICRISAT trial farmers the yield is higher at 1.1 t ha^{-1}. The average profit per hectare is also higher at Rs.2045 per hectare in comparison to Rs.1773 in share cropper operated farms.The exploitative nature of the share cropping contracts(20:80 ratio and 33:66) ratio) is documented. The policy implications are analysed, and intervention strategies are recommended to the stakeholders to facilitate equitable development among farmers and share croppers.

CHAPTER 1

INTRODUCTION

1.1 LAND AND DEVELOPMENT IN INDIA

The importance of a well defined rural development strategy in the overall strategy of growth and development can never be overstated. The analysis of the national income statistics reveals that the share of agriculture in the Net Domestic Product has fallen from 54% in 1931 to only 28% in 1993-1994, with a marginal decline in the population engaged in agriculture from 71% to 65% (See Table No. 1). The worsening terms of trade of agriculture vis-à-vis the industrial and tertiary structure has meant that the growing population has been left worse off than before with more people having lesser incomes. A recent study by Suryanarayana (2000a, 2000b) argues that the present methodology for calculating the poverty ratios underestimate the true extent of poverty and his calculation reveals that the people living below the poverty line are 75% of rural India and 54% of urban India. The study makes the failure of the Indian planning process look even more startling and throws up fresh challenges to the policy makers.

Table 1.1: Share of Agriculture in National Income and Workforce, 1931-1994

Year	Share (% of Agriculture in)	
	Net Domestic Product	Work Force
1931	54	71
1951	52	73
1961	49	70
1971	43	67
1981	36	67
1985-86	33	66
1990-91	32	65
1993-94	28	65
1996-97	26.1	

Source: Shah (1998-43) citing Bhaduri (1993), EPW Research Foundation (1995) Planning Commission (1997).

The development strategy in the post-independence period has had major interventions from the Government and include, The 'Big Push' strategy of industrialization within a mixed economy framework, the launching of the Intensive Agricultural Development Programme, "Green Revolution" in the 1960s, Land and Tenancy reforms and the launching of various direct poverty alleviation schemes. The evolvement of the Planning process in the initial years has been documented by Chakravarty (1987). The articulation of a strategy for Land Reforms was made in the Second Five Year Plan Document which included a chapter on "Land and Reform and Agrarian Reorganization" which enunciated a strategy for land reform which would form the basis of a more progressive agrarian structure. It was hoped that this would increase agricultural output and among many people, Nehru regarded cooperative farming as an ultimate solution. It was believed that the programme of community development and national extension would constitute an essential catalyst in this process, along with irrigation.

The Planners in the Second and Third Five Year Plan believed that in the early stages of industrialization it was necessary for agriculture to contribute to the building up of a modern industrial sector by providing cheap labour and also cheap food. It was argued this would help in maintaining a low wage in the industrial sector (Hayek, 1975). The monsoon failures in 1965 and 1967 lead to catastrophic decline in food production and to overcome the agricultural stagnation, the Green Revolution strategy was adopted in 1969. Elaborating on the shift in strategy, Chakravarty articulates

> "Earlier theorizing had maintained that ..... it was basically the absence of knowledge, of appropriate agricultural practice along with the maintenance of an obsolete social structure, which prevented increase in agricultural production. Land reform was considered very important, at least in principle, in practice the issue was largely evaded. The new strategy seemed to deny the critical importance of the issue even on the level of principle. Instead, emphasis was shifted to technology modernization. It was also openly admitted that it was essential to bet on the strong" (Chakravarty, 1987, P. 27).

It was largely agreed that despite the largest body of land reform legislation being passed in a short period of time (See Thorner, 1976), the major problem has been the unenthusiastic implementation of the legislation and political scientists have argued that the Congress party which has been in power for most of the time in this period, consisted of politicians and Ministers from the Land owning classes who were not sympathetic to the interest of the landless and small farmers.

Despite the above problems, a recent study by Besley and Burgess (2000) which uses state level data for sixteen main states from 1958 to 1992 finds that land reforms have led to poverty reduction in India and according to the study:

> "Our main finding is that there is a robust link between land reform and poverty reduction. Closer scrutiny reveals, that, in an Indian context, this is due primarily to land reforms that challenge the terms of land contracts rather than redistributing land" (*ibid*, P. 39).

1.2 LAND REFORM LEGISLATION

The Land Reform Acts can be classified into four main categories according to their purpose (Mearns, 1988). The first category is related to tenancy reform which attempted to regulate tenancy contracts both via registration and stipulation of contractual terms, such as shares in share tenancy contacts, as well as to abolish tenancy and transfer ownership to tenants. The second category has attempted to abolish intermediaries who worked under feudal lords (zamindars). The Third category was acts which attempted to implement ceiling on land holdings and finally there were acts that attempted to allow consolidation of disparate land holding.

> "A broad assessment of the programme of land reform adopted since independence is that the laws for the abolition of intermediary tenures have been implemented fairly efficiently while in the fields of tenancy reforms and ceilings on holdings, legislation has fallen short of the desired objective, and implementation of the enacted laws have been inadequate" (Fifth Five Year Plan, 1974-79, p.2).

Tenancy reform have succeeded where tenants are well organized, in other cases there have been large scale cases of mass eviction of tenants and the de-

jure banning of landlord-tenant relationships pushing underground and paradoxically reducing tenurial security. The role of political will and the need for mass mobilization is emphasized in the studies of the experience in Kerala and West Bengal. Oomen and Dasgupta explain that-

"Unless land reforms are backed up by mass mobilization with a government sympathetic to the working class both at the state and at the centre, they cannot succeed. This is an important lesson to be drawn from the experience of Kerala. (Oomen, 1990, p.31).

"The political will of government while the most crucial factor, would not by itself bring about a radical change in land relations without organized mobilization and active participation of the intended beneficiaries in the programme" (Dasgupta, 1982, p. 18).

The intervention in Madhya Pradesh in terms of legislation enactment is as follows:

1974 - Agricultural Workers Act - Called for Employment Security, fixed hours, minimum wages.

1950 - Abolition of Proprietary Rights (Estate, Mahals, Alienated Lands) Act - Abolition of intermediaries.

1951 - United States of Gwalior, Indore and Malwa Zamindari Abolition Act - Abolition of Intermediaries.

1951 - Abolition of Jagir Act - Abolition of Intermediaries.

1952 - Madhya Pradesh - Abolition of Jagir Act - Abolition of Intermediaries.

1959 - Land Revenue Code - Leasing Prohibited, entitles occupancy rights to ownership rights of non resumable area on payment of 15 times the land revenue; Implementation of reform inefficient, one reason being that sharecroppers and tenants were not recorded.

1959 - Consolidation of Land Holdings Act - Introduction of compulsory consolidation.

1960 - Ceilings on Agricultural Holdings Act - Imposed ceiling on landholdings of 10.12 hectares (1960-1972) and 4.05-21.85 hectares (after 1972.

Source: Besley and Burgess 2000, pp. 398-399.

The assessment by Besley and Burgess (2000) of the implementation in Madhya Pradesh has been that although leasing has been prohibited by the 1959 Law Revenue code and the law entitles occupancy rights of non resumable area on payment of 15 times the land revenue, "implementation of reform (is) inefficient, one reason being the share croppers and tenants are not recorded" (P. 399).

The Government of Madhya Pradesh in its 1998 Human Development Report (P.249) does recognise the existence of share cropping. In Vidisha District, only 1.7% of land holding is reported to be self operated with 79.4% being leased-in. The term 'other wise' possibly refers to illegal cultivation that is undertaken in the common and government land.

The land ownership in the district according to the report is as follows.

Table 1.2: Land Holding in Vidisha District

Wholly owned and self operated holdings		Wholly leased in holdings		Wholly otherwise operated holdings	
Number	Area	Number	Area	Number	Area
1.7%	0.9%	79.4%	63.1%	18.6%	31.2%

Source: MPHDR, 1998 citing Directorate of Agriculture, Agricultural Statistics, 1990-91 and 1993-94, Commissioner of Land Records.

1.3 OBJECTIVES OF THE STUDY

The objectives of the study are -

(i) To study the relationship between land Size and productivity among owner operated farms and share cropper operated farms.

(ii) To examine the profitability for owner operated farmers, landlords and share croppers.

(iii) To recommend policy interventions for the Madhya Pradesh Government and intervention strategies for the stakeholders, International Crop Research Institute for Semi-Arid Tropics(ICRISAT) and the NGO, Bharatiya Agro Industries foundation(BAIF) in promoting equitable development among the farmers and share croppers.

1.4 STUDY AREA

The data was collected from Lateri Watershed in Lateri block of Vidisha District, Madhya Pradesh. The stakeholders involved are BAIF as the implementing agency with funding support from the Rajiv Gandhi Watershed Mission and ICRISAT, which provides technical support and is conducting trials for promotion of improved watershed management practices. The villages selected for the study were Jaoti, Kherkhedi and Kundhankhedi and Lalatora in Lateri Block of Vidisha District.

1.5 METHODOLOGY

Primary Data were collected from the above villages using an Interview Schedule. Owner operated farmers and the Share Croppers were interviewed. The data were collected in the first fortnight of October 2000 and a repeat visit was made in the last week of November 2000. The data on trial farmers (owner operated farms) from Lalatora was collected by the Agriculture Officer, Lateri. Watershed Data has been analysed by using the correlation technique to understand the relationship between various variables. The selection of the villages was through purposive sampling to enable the sample to contain both owner operated farmers and share

croppers who cultivate soybean. The selection of the respondents was done through random sampling.

The sample for the study was as follows:

Table 1.3: Details of Sample for the Study

Village	Owner Operated Farms	Share Croppers	Total
Jaoti	18	20	38
Kherkhedi	12	13	25
Kundhankhedi	9	4	13
Total	39	37	76

In addition to the above data, information on the Crop yields from 12 ICRISAT Trial farmers (owner operated farms) in Lalotora was used for a comparative analysis

1.6 ORGANISATION OF CHAPTERS

The First Chapter introduces the thesis topic. The Second Chapter reviews the literature on land Size - Productivity relationship and Share cropping in India.The Third Chapter discusses Soybean Production and Productivity in India. The Fourth Chapter introduces the Study Area. The Fifth Chapter discusses the relationship between Land Size and Productivity and profitability among owner-operated farms and the Sixth Chapter discusses it among Share Croppers. The Seventh and last Chapter summarizes and recommends the possible policy interventions and intervention strategies for the stakeholders.

CHAPTER 2

REVIEW OF LITERATURE

2.1 LAND SIZE - PRODUCTIVITY RELATIONSHIP

The discussion on the inverse relationship between land size and productivity in agriculture could be traced back to the work of Chaynov(1966) who examined data for Russian Agriculture for the 1920's and 1930's. In India the identification of this relationship came after the analysis of the data on Farm Management Studies (FMS) in the mid 1950's (See Bhardwaj, 1974, Saini, 1969 and Bhagwathi and Chakravarthy, 1969). It was observed that small farms, on average employed more input per acre and as a result had a higher output per acre. Sen (1962) initiated the debate by providing evidence of the inverse relationship based on FMS data and he observed that if the market wage rate is imputed to family labour many of the farms show losses and profitability increases with the size of the holdings.

Sen (1966, 1975) provides an explanation in his theory of 'agricultural dualism' where the traditional small peasant is assumed to be endowed with plentiful labour with low or zero opportunity cost while facing a severe constraint on credit. These farms would employ labour upto to the point of zero marginal productivity. Large farms, however would employ labour upto to the point where the wage rate equaled the marginal product. As a consequence the peasant sector will apply more labour per acre than the capitalists. This can explain declining productivity in terms of output per acre but increasing profitability. Srinivasan (1973) agues that if farmers are maximising the expected utility of their income (and if they are risk averse), then it is optimal for small farms to employ more inputs per hectare.

There were however other studies in the 1960's which provided evidence that inverse relationship might be weak, if not existent (Rao, 1967, Rudra 1968). Rudra's study analysing individual holdings in 20 villages noted that in 18 villages, the data failed to reveal any dependence of yield per acre on farm size while in the case of one there was in fact a positive relationship and the remaining one revealed no systematic pattern. Bhardwaj's (1974) study using the FMS data hypothesised that the inverse

relationship could have arisen on account of aggregation where data were presented as size group averages whereas in the above two studies, disaggregated data at the individual level was used. However later studies by Saini (1971) and Bhattacharya and Saini (1972) provided support for the hypothesis of the inverse relation.

Saini (1971) analysed 25 sets of disaggregated farm level data from nine states and in 18 of the data sets the inverse relationship was found to be true. Bhattacharya and Saini (1972) analysed data from sample villages in Muzzafarnagar in Uttar Pradesh and Ferozepur in Punjab and on the whole they confirmed the inverse relationship between size and productivity for Muzzafarnagar, but found the situation for Ferozepur relatively unclear. Sen's (1981) study of sample village from West Bengal uses the value of output per acre as a measure of productivity and establishes the existence of a negative relationship between productivity and farm size in owner operated farms. In owner operated farms that have leased-in land the trend is not clear. The very smallest farms have the lowest productivity, but among the remaining classes of farms, productivity continues to decline with size. In the share cropped land in every size class, the productivity per acre on share cropped land is lower than the productivity of the same farms under owner cultivation.

The inverse relationship appears at an aggregate level as well, even when the differences between the owner occupied and tenant land is not taken into account. Cline's study (1979) based on data from India (as a whole), Northeast Brazil, Punjab (Pakistan) and Muda in Malaysia supports the decreasing farm size relationship. Regardless of the form of operation, size plays an important role. The study suggests that larger the size differences, larger are the productivity differences. In North East Brazil, the small farms are over five times as productive as compared to the largest farms while the ratio narrows down to 1.5 times to Muda, Malaysia. Thus, as Binswanger, et.al (1995) have noted, there is greater support for the hypothesis those regions of greater inequality have proportionately more to gain under an efficiency view point alone from land reform.

The under investment of inputs, particularly as land size increases have been examined extensively in the literature. The transaction costs of investment are higher for small farmers as credit markets are imperfect and loans are usually available only with land as collateral or at exorbitant interest rates from moneylenders. If this is the

case, which often is, the bigger farmers who have better access to the institutional credit market should be investing inputs according to scale but the evidence from empirical literature is contrary to that. The reason for the under-investment is due to the risk-averse behaviour and Rosenzweig and Binswanger (1993). The study(using ICRISAT data) provides evidence that the variability of monsoon is a significant variable. The study shows due to variability in the monsoons, the wealthier farmers are more likely to undertake riskier investments due to their ex-post consumption smoothing mechanisms, whereas poorer farmers would not take that risk, even if they would have to be satisfied with lower but stable incomes.

2.1.1 Quality of Land

Studies have noted that adjustment for land quality diminishes the inverse relationship (Khusro, 1964, Sen, 1975, Bliss and Stern, 1982). It is argued that the inverse relationship is a spurious result caused by the bias due to the omission of land quality in regressions (Bhalla and Roy, 1988). The role of distress sale in transferring poor quality land from small farmers to bigger farmers has been noted by Bhagwathi and Chakravarty (1969). The empirical evidence on the inverse relationship predominantly supports the existence of the inverse relationship. Dissenting arguments based on the evidence of the quality of land have been important contributions that have questioned this relationship.

2.2 SHARE CROPPING AND PRODUCTIVITY

The New Palgrave Dictionary of Economics defines share cropping as thus

"Share Cropping is a form of land tenancy in which the landlord allows the tenant to use his land in return for a stipulated fraction of the output".

The land tenure arrangements in India have evolved under the Mughal rule in the 17th and 18 centuries, British rule in the 19th and 20th centuries and the practice of Share Cropping can be traced back at least to as far as the Mughal period. In Europe Adam Smith (1776) believed that the metayers (share croppers) of France were the successor of the Slave Cultivators of ancient times. Commenting on the metayers

system in France Arthur Young who was the secretary to the Board of Agriculture in England said that

> "There is not one word to be said in favour of the practice, and a thousand arguments that might be used against it... In this most miserable of all the modes of letting land, the defrauded landlord receives a contemptible rent; the farmer is in the lowest state of poverty; the land is miserably cultivated; and the nation suffers as severely as the parties themselves... Wherever this system prevails, it may be taken for granted that a useless and miserable population is found" (Edwards, 1892, pp. 202-203).

The efficiency of Share Cropping has been a long debated issue and one of the earliest advocates of the inefficiency hypothesis was Adam Smith. He argued that it was not in the interest of the share croppers in improving productivity of the land as he got only one tenth of the product (Smith, 1776-367). The 'slave' cultivators preceding the metayers were succeeded the 'slaves' and 'by very slow degrees' the metayers were succeeded by farmers... who cultivated the land with their own stock, paying a certain rent to the landlord" (*ibid* 368). Smith favoured fixed-rent contracts and was concerned with the insecurity of the farmers because of the expiration of the lease. He advocated "the law which secures the longest leases against successors of every kind" (*ibid*-369). It was also criticised by important English classical economists.

Marshall (1956) argued that Share Cropping lead to a Pareto-inefficient allocation of labour. Marshall studied the problem from the view point of a share tenant who can share crop at a stipulated rate of rental and the share cropper land can allocate his labour between the share cropped land and outside at an exogenously fixed wage rate. The rental share paid to the landlord was tantamount to an excise tax on the share cropper's effort and this would induce the share cropper to reduce his output below the wage level where the marginal product of the share cropping is equal to the wage level. This under provision of inputs by the share cropper (or labour by the wage labourers is characterized as "Marshallian inefficiency" in subsequent literature.

Johnson (1950) provided three solutions to the inefficiency problem - first to enforce the desired level of cultivation by the tenant, second to insist on shorter term leases which would enable the landlord to make periodic review of the performance of the Tenant and thirdly to split the expenses of cultivation in the same proportions as the rental rations thus making the tenant's 'internal' price of an input equal to its 'external' price.

The Marshallian tradition was built on the implicit assumption that the share contract refer to only one variable, however as pointed to by Johnson and subsequently by Cheung, a contract need not contain only one variable. Cheung (1969) argues that many real world contracts (drawing evidence from Taiwan) specify such items as the amount of land to be cultivated, non labour inputs to be supplied, etc., in addition to the rental share. The argument is as follows: if the labour-intensity of the share cropped land is less than under wage cultivation, the landlord can earn higher rental income either by self cultivation (through hired labour) or by fixed rental tenancy. On the other hand, if the landlord insists on a higher labour intensity on the share cropped land there would not be any tenant available for share cropping. Therefore the optimum would require the labour-intensity on the share cropped land should be such that the marginal product of labour is equal to the wage level and the rent per unit is equal to the marginal product.

This idealistic and artificial analysis has been critiqued. Jaynes (1982) has rightly argued that

> "The tenant representation in this process is superfluous. Tenants make no real choices as to labour supply, but simply choose the various all or nothing offers made unilaterally by landlords... The role of wage in Cheung's analysis is just to ensure efficiency. The model is adhoc".

Bardhan and Srinivasan (1971) were the first to extend the conventional unilateral maximisation approach to a general equilibrium approach. They allow both the landlord and the tenant to influence in determination of the share rental while retaining the perfectly competitive labour market assumption of Cheung and Marshal. The share-tenant in the model has the option of leasing in land to cultivate with his own labour or working as a wage labour in some alternative employment. The tenant

is assumed to maximize his utility in terms of income and leisure. On the supply side, the landlord has the option of cultivating his own land or renting it out to the share cropper. The landlord like the tenant is assumed to maximize his utility, which is defined in terms of income and leisure. Combining the demand and supply functions so derived they go on to determine the competitive share-rental rate.

Bhaduri's (1973) contribution has been a significant one in which he shows that a landlord who is a provider of consumption loans to his tenant may have no incentive to adopt yield-increasing innovations, if the landlord's interest from his loans to the tenant does not go down (because the tenant will borrow less as he shares the increased yield). This proposition has been criticised by Ghose and Saith (1976). Newberry (1974) Srinivasan (1979) and others that it is a weak constraint on adoption of technical progress and it is argued that if the landlord has sufficient power to exploit his tenant-borrower and to withhold the innovation, then he ought to have sufficient power to gain from the innovation.

Bell and Braverman (1981) show that an income maximising land lord will always prefer to self-cultivate rather than employ a share cropper (to escape from Marshallian inefficiency). A modification of the Marshallian tradition is provided by Lucas (1979) presents a joint optimising system which is differentiated from others by the feature that wage labour requires monitoring in order to extract full effort. Landlords may prefer share tenancy contracts because under that workers have an incentive to work hardener even without supervision. The costs are the monitoring costs for the landlord and for the tenant it is the share tax on the extra output produced. He finds that mixed wage and share tenancy contracts along with share tenancy contracts provides higher social welfare than a wage only contract.

The most common answer given for the existence of share cropping is the existence of agricultural risk. It is seen as a risk between the landlord and the tenant (Newberry, 1979) has developed an approach drawing on insights from the capital market. Each leasing agreement (share cropping or renting) or self-cultivation is viewed as an asset with specific risk and return characteristics. The landlord's problem is to allocate his land between the assets is such a way as to maximize his expected income. The result from their analysis is that incorporating uncertainty provides

scarcely any rationale for share cropping. It is argued that the mixture of rental and wage agreements provides exactly the same income as share cropping.

Determination of Rental Share Resource Allocation and Distribution of Income

Bardhan and Srinivas (1971) developed a scheme of analysis wherein the rental share is regarded by the parties of the contract 'as a price-like variable', i.e. it is parametrically given to all agents. For an exogenously given real wage rate, the supply of and demand for leases determine the rental share. A second approach formulated by Cheung and extended by Newberry (1973), in which both the rental share and the minimum labour per unit of land are stipulated in all contracts, their values being jointly determined by the landlord's desire to maximise his income subject to the conditions that the tenant's income does not fall below his alternative earnings in a perfectly competitive labour market.

2.2.1 Role of Tenancy in Imperfect Rural Markets

a. Tenancy as a Mechanism for Resource Adjustment

Tenancy is a contractual system that enables rural households to adjust their resources, particularly land in relation to their endowment labour and draft power. Thus rural households may find that they are better of in leasing land than seeking wage employment given the limited and uncertain job opportunities in rural areas. Conversely where labour is scarce, especially during peak seasons, landowners may prefer to lease out land rather than depend on an uncertain supply of lahour.

b. Tenancy and Incentives

The argument that tenants have a greater incentive to work than wage labourers is rooted in classical economics in the writings of Adam Smith, J.S. Mill and Marshall. Smith argued that in Europe share-tenancy succeeded serfdom which itself gave way to fixed rent tenancy.

c. Tenancy as a Credit System

In developing countries like India where markets for capital and credit are underdeveloped, the only way a person may have of gaining access to these resources is to enter into a tenancy contract. This is one of the main incentives in rural India where consumption loans and provision of goods in kind is strong incentive. Braverman and Stiglitz (1980) have argued that there are good reasons for this arrangement as it both lowers the cost of credit to the tenant and enables the landlord to monitor the tenant's effort. Landlords also provide credit to the tenants by supplying them inputs, with the tenant's contractual share of the costs being subtracted from his share of the output after the harvest.

d. Tenancy, Risk and Entrepreneurship

Agricultural production and its returns are risky and have an important bearing on the contractual system and in turn the contractual system has a differential effect on the landlord and the share cropper. Cheung (1969) was the first to put forward the hypothesis that the choice between different forms of land tenure arrangements was likely to be affected by the parties risk aversion under uncertainty.

Tenancy contracts do provide an incentive for effective realization of the entrepreneurial abilities provided the contractual terms are favourable. Rao (1971) noted that share cropping seemed more prevalent in India where crops provided little scope for decision making by tenants, whereas fixed rent contracts were most often needed when more decision making was required. Rao found from his data in South India that share cropping dominated rice producing areas with assured irrigation, while fixed rents prevailed in tobacco growing areas. In the tobacco growing areas the small holders tended to lease out to large holders. Newberry (1975) suggested that fixed rent contracts might be preferred for crops requiring entrepreneurial skills where

(i) landlords were more risk averse than the tenants, or

(ii) tenants had special skills that they did not wish to share with landlords,

(iii) landlords faced the problem of 'moral hazard' - that they could not determine whether shortfalls in output were the tenant's fault.

Tenancy and Transaction Costs

The Transaction costs depend on the nature of the contract. Cheung (1969) argued that these costs were higher under sharecropping than fixed wage or fixed rental arrangements.

Datta (1980) points out that as long as there is an imbalance between ownership of land and labour, some form of tenancy must result. Each form involves some 'inefficiency' produced by the transaction costs of enforcing and monitoring the contract.

> "When labour is hired at a fixed wage rate, labour shrinks in both quantitative and qualitative terms. When land is leased-out at a fixed rent the tenant has little direct incentive to maintain the soil fertility, irrigation facilities and other durable assets attached to land. On a share contract where the tenant receives a share of the total output, both problems are present, but each in a lesser degree than under fixed payment contract... The degree and character of monitoring however vary across contract types from continuous and detailed in the case of fixed wage contracts where the landowner works alongside the labourer, to infrequent and 'after-the-fact' for many fixed rent contract" (P. 70).

Tenancy, Indivisibility and Economies of Scale

There are many indivisibilities in farming, an important example is the availability of draft power, in the form of a pair of bullocks. Since the rental market in draft animals is poorly developed, those with some land but without draft power may decide to lease out land to others who posses draft power. Small farmers who own very little land may find that the best way they can use their indivisible input of draft power is to rent in additional land. Diseconomies of scale are also a reason for the prevalence of tenancy. Owners will often lease out distant plots and lease in conveniently located ones, owners with dry land would lease in Irrigated land to be grown in the rainy season.

Specification of Inputs

Share Cropping is deemed to be inefficient because under the terms of a share contract, the tenant has insufficient incentive to optimise the use of the resources on the share cropped land. Rudra (1975) and Bhardwaj and Das (1975) report that tenants in West Bengal and Orissa made most decisions about cultivation, in other areas especially once HYVs are introduced share contracts often involve agreements on the inputs to be used, their quantities and the cropping pattern. Parthasarthy and Prasad (1978) noted that in West Godavri in Andhra Pradesh, when modern varieties of rice were introduce decision making shifted to a great extent on the landlord, Bardhan and Rudra (1980) report similar results.

Cost Sharing

There is no systematic data on cost sharing arrangements, however a large number of studies from South Asia suggest that cost sharing is more common. In particular landlords have been increasingly sharing in the costs of inputs like fertilisers, pesticides, HYV seeds, land tax and irrigation charges in proportion to their share of inputs. Vyas (1979) reported that in Gujarat in the 1950s, tenants supplied family labour, bullocks, implements and seeds while all other costs were equally shared. Rudra (1975) reported from West Bengal that cost of labour, bullock and plows were the responsibility of the tenant, irrigation costs were borne by the landlord while seed and fertilizer costs were share equally. Jodha (1979) reported wide

variations in input and output shares in the semi-arid regions of Maharashtra and Andhra Pradesh, a tenant's share in input and output was normally 50% but latter could rise to as much as 75% if mid-season difficulties increased the cost of cultivation. Most of the studies report the 50-50 ratio in cost of cultivation and output shares.

2.2.2 Efficiency of Share Cropping

The evidence is mixed regarding the efficiency of share cropping. The studies that conclude that the behaviour of share croppers is basically not different from that of owners include Rao (1971) with evidence from Andhra Pradesh, Chakravarty and Rudra (1973) with evidence from five Indian districts. Dwiedi and Rudra (1973) with data from Wet Bengal. The following studies have reported the Marshallian proposition of higher input and output intensities per unit on owned relative to share cropped land - Bell (1977) with data from North of India, Chattapodhay (1979) from West Bengal, Shahban (1987) with evidence from 8 districts in India and Deininger and Feeder (1993). Bliss and Stern's (1982) intensive study in Palanpur, Uttar Pradesh have reported mixed evidence.

2.2.3 Comparison of share Cropper vis-à-vis Owner Operated Farms

Parthasarty and Prasad (1974) in a micro level study found no differences in terms of yield per acre between share croppers and owners. Similar conclusions were drawn by Bliss and Stern (1982). Shahban (1987) compared the yield of share croppers on their own land vis-à-vis leased in land from eight ICRISAT study villages from Andhra Pradesh, Maharashtra and Gujarat. The main empirical finding of the study are that - (a) Output and input intensities per acre are higher on the owned plots of a mixed share cropper compared with the share cropped plots. (b) Differences in irrigation across tenure status is important in explaining a large fraction of the input and output differences; soil quality variations are not (c) When the variation in irrigation, plot value and soil quality is controlled for no systematic differences between the plots that are owned and those rented on fixed basis could be detected. The study therefore argues the sizeable differences found in the case of share croppers is caused by the form of contractual arrangements and not tenancy per sec.

CHAPTER 3

SOYBEAN PRODUCTION AND PRODUCTIVITY IN INDIA

The Post-Independence strategy of agricultural development lay a greater emphasis on attaining self-sufficiency in cereals and support in terms of technological and institutional inputs were directed towards it. In this process, pulses the major source of protein and edible oil remained neglected and the country relied on imports to bridge the shortfall in pulses production. The Yellow revolution associated with the quick spread of oil seeds since the 1980's took root in the less Irrigated areas of low and erratic rainfall in the Semi-Arid Tropics of India. In India in the mid-1980's, the country was importing 30% of its requirement of edible oils bringing a strain on the balance of payment account. A Technology Mission on Oil Seeds was launched in May 1986 and this resulted in a gradual but steady rise in the domestic market prices of oil seeds as imports of oil seeds were restricted through non-tariff regulations. This trend was further accentuated in January 1989 when the National Dairy Development Board serving as the apex agency was set up. During this period about 7 million hectares of additional area came under oil seeds, partly from rainy season fallow, partly through crop intensification and a substantial part through crop substitution. The shift was largely from coarse cereals, but in some pockets even pulses and wheat gave way to oil seeds (Gulati and Kelly, 1999).

India in the Oil seeds scenario accounts for 19% of the total area and 9% of the production, however the productivity is only 0.93 t ha^{-1} as compared to the world level of 1.63 t ha^{-1}. Oil seeds form the second largest commodity after cereals in India, accounting for 14 per cent of the country's Gross Cropped area and nearly 5% of the GNP and 10% of the value of all agricultural products. Fourteen Million people are involved in the production of oil seeds and 1 Million in processing (Hegde, 2000).

Given the deficit in pulses as well as edible oils, soybean assumes great significance as it contains about 45% protein and 18% oil. Though soybean (black) is traditionally grown on the foothills of the Himalayas, Kumaon and Garwahal regions of U.P. and some scattered pockets in central India, the awareness about soybean, the

exploitation of its commercial potential and the introduction of yellow soybean is of recent origin starting with research at experimental stations in the mid 1960's. The prospect of promoting black soybean, cultivated traditionally in some parts of India were low due to its low yield, colour hard seed coat and lack of a market. Soybean seeds were introduced from the U.S.A. and tried between 1963 and 1965 at IARI, New Delhi, Pantnagar and Jabalpur. The University of Illinois, United States Agency for International Development (USAID) and Indian Council for Agricultural Research (ICAR) collaborated in this effort. Experiments suggested that a varietal break through of local conditions might be achieved and the all India Coordinated Research Project on Soybeans sponsored by ICAR was initiated in 1967 with its headquarters in Pantnagar. There are 19 centres involved in the project in different agroclimatic regions.

India's share in the world Soybean production in 1998-1999 was 5.2%, with production of 6 million tonnes out of the total world production of 159.85 million Tonnes.

The important Soybean producing countries and their yields are as follows.

Table 3.1: Soybean Production and Yield in the World

Country	Production (1999-2000) (Million Tonnes)	Yield (t ha^{-1})
U.S.A	71.93	2.45
Brazil	31.40	2.36
Argentina	20.70	2.42
China	14.29	1.75
Paraguay	2.90	2.52
European Union	1.14	3.12

Source: Oil Seeds : World Markets and Trade, Circular Series FOP 08-00, August, 2000, United States Department of Agriculture.

0.94 t ha^{-1} is the average yield in India, with Madhya Pradesh, Rajasthan and Maharashtra having an average yield of 1.06 Tonnes Per Hectare. The Yield reported is the average for the Triennium ending 1993 (Source: ICRISAT, 1999, Typology Construction and Economic Policy Analysis for sustainable Rainfed Agriculture).

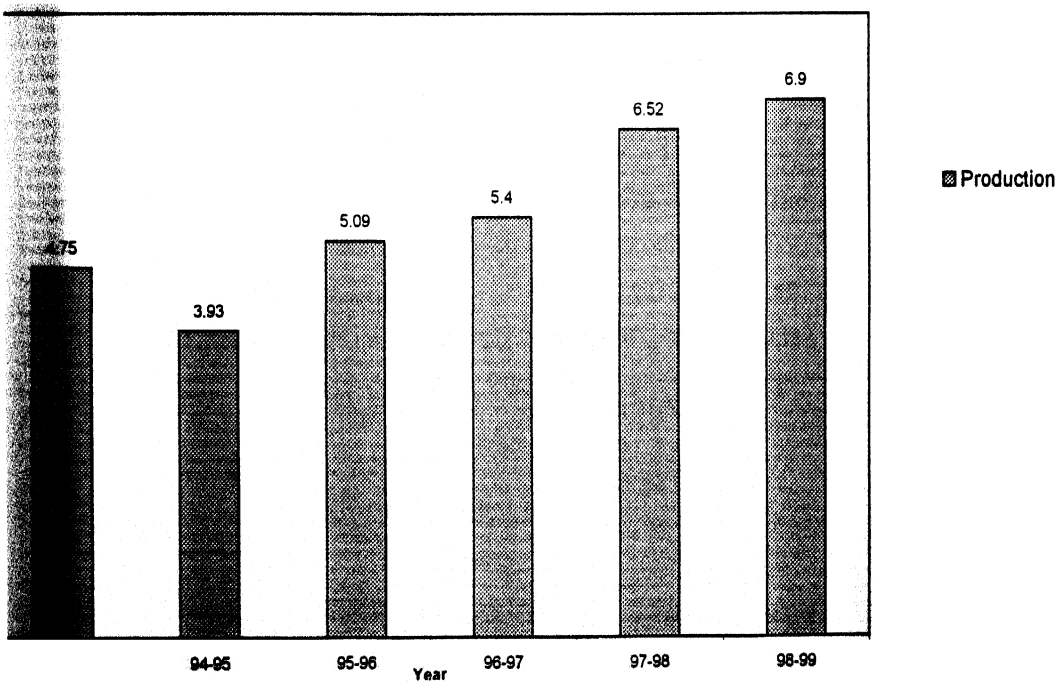
Soybean Production from 1993 has been as follows:

Table 3.2: Soybean Production in India (Since 1993)

Year	Production (in Million Tonnes)
1993-1994	4.75
1994-1995	3.93
1995-96	5.09
1996-97	5.4
1997-98	6.52
1998-99	6.90

Figure 3.1

Soybean Production in India(Since 1993)



3.1 SOYBEAN PRODUCTIVITY IN INDIA

The Productivity of soybean in the 1970's and 1980's wee as follows:

Table 3.3: Productivity of Soybean in India (1970's and 1980's)

Year	Area ('000 He)	Production ('000 Tonnes)	Yield (t ha^{-1})
1970	4	2	0.54
1975	120	120	0.75
1983	836	614	0.73
1987	1392	850	0.61

Source: Bapna, 1992 citing FAO Year Book-various issues.

ICRISAT (1999) estimates productivity of Soybean for the below zones The data is the averages of the triennium ending 1993.

Zone 3 (Irrigated wheat zone of Central Madhya Pradesh and U.P) : 1.02 t ha^{-1}

Zone 8 (Rainfed Wheat-Chickpea zone of Central Madhya Pradesh : 0.81 t ha^{-1}

Zone 9 (Soybean dominant zone of Western Madhya Pradesh : 1.06 t ha^{-1}

Zone 10 (Rainy Season Sorghum-Cotton-system of Western Maharashtra and parts of Madhya Pradesh : 0.96 t ha^{-1}

70% of India's Soybean is produced in Madhya Pradesh and the Gross Cropped Area in 7671.7 (1000 Hectares). The average yield for Madhya Pradesh varies from 0.81 to 1.06 t ha^{-1}. The Productivity in research farms is 2.5 t ha^{-1} (ICRISAT, 2000) compared to the average of 1.06 t ha^{-1} in Madhya Pradesh and 0.94 t ha^{-1} in India as a whole.

3.2 SOYBEAN UNDER A LIBERALISED TRADE REGIME

India signed the Uruguay Round Agreement (URA) of the General Agreement on Tariffs and Trade (GATT) vested in the World Trade Organisation which makes it mandatory for member countries to gradually open their agriculture to world markets. The URA commitments in the area of agriculture fall under three main categories namely market access, domestic support and export competition.

Market Access: Under market access commitments, all member countries of the GATT are required to (a) replace all type of non-tariff barriers with tariff barriers and (b) reduce the level of tariffs under a time bound programme, theses levels are to be reduced by 24% in case of developing countries. The period within which these restrictions are to be taken up varies from six years in the case of developed countries to ten years in the case of developing countries.

Aggregate Measure of Support (AMS): The AMS is the annual aggregate value of market price support, non exempt direct payments and any other subsidy not exempted from the reduction commitments expressed in monetary terms. If the product specific and non-product specific exceeds 10% of the total value of agricultural production, it is to be reduced by 13.3% of the value that does not qualify for exemption during the implementation period. India has basically two types of support for farmers. First market price support, which is in the form of minimum support prices, announced by the Commission for Agricultural Costs and Prices. Second is in the form of input subsidies on inputs like fertilisers, irrigation, credit and seeds. The calculations for India shows that AMS for 17 major commodities including Soybean is negative. This negative support (or net taxation) is due to the fact that prices of different crops are fixed by the government below international levels.

Export Competition: The GATT agreement calls for reducing export subsidies by 24% from their 1986-88 level in case of developing countries over a period of ten years. The quantity of subsidized export is to be reduced by 14%.

Domestic Policy on Liberalisation: In February 1995 almost all edible oils (except coconut oil) have been put under the Open General license (OGL) with an import duty of 30%. In July 1996 it was reduced to 20% and in July 1998 the effective duty on edible oils works out to be 15%. Under the market access clause, members are required to convert no-tariff barriers and submit ceiling tariff bindings for all commodities. For Oil seeds in general the government committed to a maximum tariff rate of 100% although the prevailing rate in April 1996 was in the range of 40-50% in order to protect the oil seeds sector.

Definition of the terms to be used

Domestic Resource Cost (DRC) - is defined as the value of domestic resources needed to save a unit of Foreign Exchange.

Resource Cost Ratio (RCR) = DRC Shadow Exchange Rate

For Soybean:

The RCR scenario and the profitability rates under an import scenario according to ICRISAT (1999) are:

Table 3.4: Resource Cost Ratio and Profitability of soybean Under a Liberalised Trade Regime.

	RCR	Private Profit Rs. ha^{-1}	Social Profit Rs. ha^{-1}	Subsidies Rs. ha^{-1}
Irrigated	1.07	4389	-1129	2091
Rainfed	0.98	6390	230	903
Average	0.99	6150	-109	

Source: Typology Construction and Economic Policy Analysis, ICRISAT, 1999, PP. 61-62.

The RCR for Irrigated soybean is 1.07, which means the country has to spend Rs. 1.07 to save Rs. 1.00 of Foreign Exchange whereas for rainfed Soybean, the country has to spend Rs. 0.98 to save Rs. 1.00 of Foreign Exchange. The private profit

is also higher with a positive social profit (due to lesser subsidies). The cost of subsidies of Irrigated soybean is Rs. 2091 per hectare in comparison with only Rs. 903 per hectare for rainfed soybean. If all subsidies were abolished, the profitability of Irrigated soybean will suffer by 48% and induce a shift away from the crop under Irrigated conditions.

Therefore the policy implication is quite clear that research priority should be given to rainfed soybean and attempts should be made to bring an increase of rainy season fallow under soybean or the replaceable crops of cotton, sorghum or maize.

To quote from an ICRISAT study,

> "Since this zone (zone 9, including M.P.) is dominated by a crop that is inefficient in resource use and low in generating social returns, it seems apparent that policies that correct for distortions in domestic prices would have their desired effect here i.e. a shift away from soybean towards sorghum, maize and pigeonpea to achieve a better allocation of resources. This must be qualified if soybean possesses specific double-crop advantages relative to other rainy-season crops" (ICRISAT, 1999, 68).

> "Given the present level of technology and relative prices of different crops, India may have achieved a high degree of 'Self Sufficiency' in edible oils in the early 1990's but at the cost of efficiency in the use of domestic resources. The challenges, therefore lies in retaining the gains of the yellow revolution while lowering the protection of oil seeds/edible oils. With the opening of imports of most of the edible oils under the OGL policy ... imports of edible oil crossed 1.5 million tonnes in 1996-97 and are likely to touch 2 million tonnes in 1997-98.

The Policy implications are clear: to sustain a high degree of self-sufficiency' in edible-oils, India will have to invest in raising yields of oilseeds as also improve edible - oil processing" (*ibid*, pp. 126-127.).

Research needs to concentrate on:

(i) Trials, which would help the farmer to be convinced that rainfed soybean under fluctuating rainfall is possible and profitable.

(ii) Increase the yield of rainfall soybean and reduce the gap between the potential and actual yield.

This would help in making rainfed soybean more competitive in an open economy environment if the policy option is to attain self-sufficiency in the production of soybean.

CHAPTER 4

STUDY AREA

The State of Madhya Pradesh is the largest in the country, spread over an area of 443, 446 sq. km (13.5% of the total area of the country, data predates the formation of Chattisgarh state). The total population of MP was 66.14 million in 1991, accounting for 7.8 % of India's population. The state compromises of 14.6 % of scheduled castes and 22.3 % of scheduled tribes. Ninety % of the rural population are engaged in agriculture, 52 % of the main working population in the state are cultivator and 23.5 % were landless labourers (TARU, 1998). The Planning Commission estimated that in 1995, 42.5 % of the state's population lived below the poverty line with the national average at 33.5 % (GOMP, 1998). However it is estimated that in Vidisha district, the poverty head count ratio is below 10%. According to the Ninth Five Year Plan, per capita income in M.P. was Rs. 6,597 as against the national average of R. 9,321. Although 90% of the rural population is engaged in agriculture, the contribution of the primary sector to the State Domestic Product (SP) is only 43 % with 25 % from secondary sector and 32 % from tertiary sector.

4.1 VIDISHA DISTRICT

Vidisha district is ranked 30th in the Human Development Index (1998) out of 45 districts in Madhya Pradesh with a HDI of 0.481 and ranked 37th in the Gender Development Index with GRI of 0.523. 1.47% of Madhya Pradesh's population live in this district, with the Scheduled caste and Scheduled Tribe population of 20.3% and 4.4% respectively. The literacy %age for males is 58% whereas for females it is 27.8% (GOMP, 1998). The Gini Coefficient of operational holding is 0.555.

The Land use pattern is as follows:

Net Sown Area	:	67%
Forests	:	13%
Other uncultivated land	:	11%
Land not available for Cultivation	:	6%
Cultivable land	:	2%
Fallow	:	1%

Irrigated area comprises of 71, 900 hectares with an unirrigated area of 44,48,800 hectares. The average Fertiliser Consumption per hectare is 29.9 Kilograms.

The Land ownership in the district is as follows:

Wholly Owned Area	:	0.9%
Wholly Leased in Holdings	:	63.1
Wholly Otherwise Operated Area	:	31.2%

Source: GOMP, 1998 citing Directorate of Agriculture, Agricultural Statistics, 1990-91 and 1993-94, Commissioner of Land Records.

The definition of 'wholly otherwise operated' is not mentioned and it is hypothesis that this refers to land cultivated on government and common land illegally. It is also hypothesised that land operated by households above the land ceiling act are also have been taken into the 'Wholly Otherwise Operated' category.

4.2 INTERVENTION OF ICRISAT AND BAIF

The intervention of ICRISAT in Lalatora village in the 1999 rainy season is part of a larger project titled "Improving Management of natural Resources for Sustainable Rainfed Agriculture" funded by the Asian Development Bank. The participating developing member countries of the project are India. Thailand, and Vietnam.

The objectives of the project are to: (i) increase the productivity and sustainability of the medium and high water-holding capacity soils in the intermediate rainfall ecoregion; and (ii) develop environment-friendly resource management practices that will conserve soil and water resources. The project focuses on the

intermediate rainfall ecozone in central India, northeastern Thailand, and northern Vietnam where the annual rainfall is about 800-1300 mm and where soils have a relatively high available water-holding capacity.

It is explained that the rationale for the interventions is due to the "Temporal variability in amount and distribution of rainfall (which creates highly uncertain agricultural environment, which results in food insecurity of poor farmers in Semi-Arid Tropics (SAT) and discourage them to make productive investment in agriculture" (ICRISAT, 2000, P. 2). It is explained that the "cycle of unsustained agriculture and soil degradation of derived communities in the Asian tropics can be stalled by the application of low-cost scientific rainfed agriculture" (ibid, p. 2). The project aims at intensification of crop production in the target environments through and the approach include the efficient water use so that the incidence of waterlogging is reduced.

The intermediate rainfall zone in Asia receives rainfall between 800 to 1200 mm annually has black soils (Vertisols, associated soils and Alfisols). The main crops in the region are rainfed cash crops such as soybean, cotton and groundnut in addition to food crops such as mungbean, maize, Pigeonpea and sorghum. In India, 72 million ha is covered by vertisol and associated soils. The area under soybean has increased 3 to 5% annually over the last 10-15 year due to the greater profitability of the crop and in 1999, 5.8 million hectares is under the crop as compared to 10,000 hectares in 1981. The productivity of soybean in research farms is 2.5 t ha^{-1} as against the current productivity level of 0.94 t ha^{-1} in India. It is estimated that the proposed technology (input practices including efforts to reduce waterlogging) would spread at an annual rate of 5% in the soybean growing areas and the ex-ante evaluation of the proposed investment in India and Vietnam is estimated to generate a Net Present Value equivalent to US $ 27 million in 10 years time. It is argued that the 'increased production of soybean might brighten the prospects of export of soybean and bring down the import of edible oils and pulses' (ibid, p. 4).

The intervention by ICRISAT in Lalatora village as a technically supported upfront demonstration watershed for the 1999 rainy season crop has been under the above project and 18 farmers were selected. The yield achieved by 12 sample trial

farmers and their comparison with other owner-operated farmers in other villages is analysed in Chapter No. 5.

Bharatiya Agro Industries Foundation (BAIF) is the NGO working in the Lateri Watershed area, Lateri Block, Vidisha district. The average rainfall in the area in 1022 mm and clay, stony and loamy soil is present in the area. The Rajiv Gandhi Watershed Mission of the Madhya Pradesh Government funds the watershed programme. The programme comprises 11 micro watershed areas covering 15 villages. The implementation has been initiated in November 1997 with a total project cost of 4.23 Crore Rupees covering 7900 hectares. The profile of the total proposed treated area is as follows.

Unirrigated	89%
Irrigated	1%
Waste Land	5%
Pasture Land	4%
Forest	1%

The area treated for soil and water conservation until 21.7.00 is as follows:

Government Land	2395.18 Hectares
Private Land	1297.86 Hectares
Total	3793.04 Hectares

Plantation work has been undertaken in 0.33 hectare of government land and 56.69 hectare of private land, while fuel wood plantation has been undertaken in 1.2 hectares of government land and 46.96 hectares of private land.

A total of 46 Self-Help Groups have been initiated with 380 members. In Jaoti, there is one Self-Help Group with three male members and another group of women also comprising three members. In Kherkhedi, there are two male SHGs comprising 19 members and two women's group comprising 21 members. In Kundhankhedi no group has been formed. These groups are not functioning to the desired levels. The patriarchal society and the prevalence of the 'purdah' system

among the women inhibits the free interaction of women in society is a strong constraint faced by any intervention strategy.

The selected sample villages are - Jaoti (800 households), Kherkhedi (200 households) and Kundhankhedi (13 households). These villages are connected by road to the nearest market place, Anandpur. The villages are electrified except a part of Kherkhedi village. Although schools are prevalent in Jaoti and Kherkhedi villages, the drop out rate for both the boys and schools is high. The nearest banks are the land Development Bank and the Cooperative bank in Anandpur village, which lends to farmer with the collateral of the land documents. There is a small river, which is close to Kherkhedi village, Jaoti village has a pond, whose desiltation from the watershed programme has helped in the recharge of groundwater. The nearest hospital is in Lalotora village, which is run by the Sadguru Seva Trust. Child marriage is prevalent in the area, Incidence of Tuberculosis is high, especially among young women, who give birth at an early age and became anemic and prone to tuberculosis. The villages are located in the radius of 25 kilometres from Lateri Block of Vidisha district, which is 150 Kilometres away from the state capital, Bhopal.

CHAPTER 5

OWNER OPERATED FARMS

The optimal management of the natural resources, soil and water with optimum input practices is necessary for sustaining and improving productivity of rainfed agriculture. The importance of the monsoons has an important variable has been recognised in the literature (Roswenzweing and Binswanger, 1993). The study year chosen is the 1999 rainy season wherein there was excessive rain, which lead to waterlogging due to poor drainage facilities. The impact of this on the decision making of the farmers and productivity is analysed.

The importance of understanding the relationship between land size and productivity (across various ownership groups) remains important even today. A survey published by the International Rice Research Institute estimates that in 1993, the arable land per capita as 0.20 ha which it is projected to reduce to 0.09 per capita by 2025. The input decisions and the resultant output at various land sizes needs to be understood for an effective strategy of growth in crop production and productivity, to achieve self sufficiency and compete in a liberalised trade regime. The yield gap between the current farm level productivity of soybean in India (0.94 t ha^{-1}) with those obtained in research plots (2.5 t ha^{-1}) needs to be reduced and more production has to be achieved if India has to convert itself into a self sufficient soybean producer from a net importer of Soybeans.The Lateri milli-watershed in Videsha district comprises an area of 7900 hectares in 11 micro watersheds covering 25 villages. The average rainfall in the area is 1022 millimeters. Clay, loamy and stony soil is the types of soil present in the area. The cropping pattern in the rainy season of the area as reported by the implementing agency, BAIF is as follows.

Soybean : 54.8%
Fodde r : 19.8%
Small Millets : 20.8%
Maize : 4.0%
Others : 0.6%

The study of owner operated farms involved the collection of primary data from 39 farmers in the villages of Jaoti (middle zone of the watershed), Kherkhedi (Lower) and Kundhankhedi (Middle Zone). The data collected by the BAIF Agriculture Officer on the yield of 12 ICRISAT trial farmers from Lalatora villages (Lower Zone) is also used to compare the yield between the trial and non-trial farmers in other villages.

The concept of productivity used in this study refers to yield per hectare. The methodology for cost of cultivation is as follows.

5.1 METHODOLOGY

a. Land preparation cost- In the case of tractors rented, the cost of hiring is Rs. 200 per hour.

b. Seed Cost- Rs.12 per Kilogramme.

c. Diammonium Phosphate(DAP)-Rs. 10 per kilogramme.

d. Single Super Sulphate (SSP)- Rs. 2.70 per Kilogramme

e. Average Wage Rates prevalent in the village (per day)
   Sowing-Rs.40.
   Weeding-Rs.40 to Rs.50.
   Harvesting-Rs.50 (upto Rs.75 in peak demand).
   Transportation-Rs.50 (Rs.30 per quintal of transportation to the market).

f. The imputed labour costs of the landlord's, share cropper is not computed in calculating the costs.

g. The cost of threshing ranges from Rs. 3 to 5 Kg. for 100 Kg. of threshing.

h. ICRISAT inputs provided to the trial farmers are - Thiram, Bavistin, Potash and Urea. The input quantity and ratio is as follows. Thiram and Bavistin seed treatment helps in healthy crop stand.
   Thiram: Bavistin - 1:2 ratio
   Rhizobium-5 packets per hectare (1.25 Kg.).
   Phosphate Solubilising Bacteria(PSB)-5 packets per hectare (1.25 Kg.)
   Murriate of Potash-50 Kg.
   Urea-50 Kg.

5.2 JAOTI OWNER OPERATED FARMS

Table 5.1: Land Holding of Owner Operated Farmers-Jaoti

Serial No.	Farmer's Name	Dry Land (ha)	Irrigable Land (ha)	Total (ha)	Sown in Rainy Season (ha)
1	Hukum Singh	4.50	0.00	4.50	0.18
2	Ram Swarup	8.75	1.25	10.00	1.25
3	Ram bir	0.25	0.25	0.50	0.25
4	Kalu ram	3.50	0.25	3.75	0.25
5	N.Singh	0.00	4.50	4.50	4.50
6	Om prakash	3.25	0.5	3.75	0.50
7	Gangaram	0.68	0.00	0.68	0.68
8	Ashok	0.00	0.50	0.50	0.50
9	Harinarayan	4.00	0.25	4.25	0.25
10	Divan Singh	4.00	0.00	4.00	2.00
11	P.Lal	0.00	6.25	6.25	1.25
12	Ram narayan	9.25	2.00	11.25	6.00
13	Hazarilal	14.75	4.00	18.75	8.75
14	Kiran	0.00	0.50	0.50	0.50
15	Baser Singh	4.00	0.00	4.00	0.62
16	Kailash	0.00	10.00	10.00	1.87
17	Prem Singh	7.13	0.37	7.50	1.50
18	Kanchigi	4.00	0.00	4.00	0.37
	Total	68.06	30.62	98.68	31.22
	Average Holding	3.78	1.70	5.48	1.73

The total land holding of the 18 sample farmers is 96.68 hectares of which 30.62 is Irrigable and the cultivation during the 1999 rainy season has been taken up in 31.22 hectares reflecting that 98.07% of the cultivated land is Irrigable land. 67.46% hectares remained uncultivated during the 1999 rainy season, which is 69.77% of the land holding of the farmers.

Table 5.2: Monetised Inputs (qty) of Owner Operated Farms-Jaoti

Sl. No.	Seeds (Kg.)	Sowing Hired Person Days	Sowing Hired Tractor Hours	DAP (Kgs)	FYM (Qtls)	Weeding Hired Person Days	Harvesting Hired Person Days
1	15	0	0	15	0	4	3
2	100	0	3.5	50	0	9	9
3	17	0	0	0	0	0	0
4	18	0	0	40	9.60	2	0
5	300	0	9	200	0	50	50
6	40	0	0	0	0	12	10
7	80	0	0	50	0	0	0
8	50	0	0	25	0	0	10
9	25	0	0	0	0	0	0
10	300	0	7	200	0	10	60
11	100	0	3	50	0	0	16
12	500	0	9	300	0	8	70
13	650	0	0	400	0	16	30
14	50	0	0	0	0	24	5
15	100	0	0	0	0	10	50
16	25	0	3	75	0	10	50
17	25	0	3	15	0	0	0
18	100	0	0	25	0	0	0

Correlation between Land Size and Fertiliser Use = 0.22

Table 5.3: Monetised Input Cost of Owner Operated Farm-Jaoti

Sl. No.	Seeds Cost (Rs.)	Hired/Own Tractor Cost (Rs.)	DAP Cost (Rs.)	Weeding Cost (Rs.)	Harvesting Cost (Rs.)	Threshing Cost (Rs.)	Trans. Cost (Rs.)	Total cost (Rs.)
1	180	0	255	200	150	29	45	859
2	1200	490	850	360	450	170	247	3767
3	204	0	0	0	0	39	45	288
4	216	0	0	80	0	68	90	454
5	3600	1800	3400	2000	2500	378	540	14218
6	480	0	0	600	500	126	180	1886
7	960	0	850	0	0	126	180	2116
8	600	0	425	0	500	105	150	1780
9	300	0	0	0	0	18	27	345
10	3600	0	3400	500	3000	420	600	11520
11	1200	600	850	0	800	273	390	4113
12	6000	1800	5100	0	3500	1155	1650	19205
13	7800	0	6800	800	1500	1002	1200	19102
14	600	0	0	1200	250	306	360	2716
15	1200	0	0	500	2500	270	360	4830
16	300	600	1275	500	2500	75	750	6000
17	300	600	255	0	0	333	420	1908
18	1200	0	425	0	0	28	30	1683

Average Cost of Cultivation Per Hectare: Rs. 3100

Table 5.4: Per Hectare Costs-Jaoti Owner Operated Farms

Sl.No	Land Size (ha)	Cost of Cultivation ha^{-1} (Rs.)	Own Person days ha^{-1} (Rs.)	Hired Man Days ha^{-1} (Rs.)	DAP cost ha^{-1} (Rs)
1	0.18	4772	61.11	38.89	1417
2	1.25	3014	21.60	14.40	680
3	0.25	1152	140.00	0.00	0
4	0.25	1816	48.00	8.00	0
5	4.50	3160	33.33	22.22	756
6	0.50	3772	68.00	44.00	0
7	0.68	3112	17.65	0.00	1250
8	0.50	3560	24.00	20.00	850
9	0.25	1380	28.00	0.00	0
10	2.00	5760	43.00	35.00	1700
11	1.25	3290	46.40	12.80	680
12	6.00	3201	14.33	13.00	850
13	8.75	2183	7.09	5.26	777
14	0.50	5432	136.00	58.00	0
15	0.62	7790	122.58	96.77	0
16	1.87	3209	40.64	32.09	682
17	1.50	1272	18.00	0.00	170
18	0.37	4549	62.16	0.00	1149

Correlation between land size and cost of cultivation per hectare = - 0.16

Correlation between land size and own days per hectare = - 0.46

Correlation between Land Size and hired days per hectare = - 0.17

Correlation between Land Size and DAP cost per hectare = 0.22

The input intensity of labour is negatively related with land size, fertiliser application has a weak positive correlation. Two farmers did not do weeding operations and input of fertilisers, 6 farmers did not do weeding operations and 5 farmers did not invest in

fertilisers. The inverse relationship between land size and labour input and a weak positive correlation between land size and DAP reflects the risk-aversive behaviour of the farmers. This is due to increased rainfall in the sowing season, which lead to water logging and increase the risk of a lesser output.

Table 5.5: Labour Inputs - Own and Hired (Jaoti Owner Operated Farms)

Sl. No.	Own Bullock (PDs)	Hired Bullock (PDs)	Weed. Own (PDs)	Weed. Hired (PDs)	Harvest Own (PDs)	Harvest Hired (PDs)	Total Man Days	Total Own Days	Total Hired Days	Person days per Hectare
1	0		0	4	4	3	11	4	7	61
2	0		0	9	9	9	27	9	18	22
3	6		20	0	9	0	35	35	0	140
4	6		2	2	2	0	12	10	2	48
5	0		0	50	50	50	150	50	100	33
6	0		0	12	12	10	34	12	22	68
7	4		0	0	8	0	12	12	0	18
8	2		0	0	0	10	12	2	10	24
9	2		0	0	5	0	7	7	0	28
10	0		6	10	10	60	86	16	70	43
11	6		36	0	0	16	58	42	16	46
12	0		0	8	8	70	86	8	78	14
13	0		0	16	16	30	62	16	46	7
14	0		15	24	24	5	68	39	29	136
15	6		0	10	10	50	76	16	60	123
16	0		6	10	10	50	76	16	60	41
17	0		5	0	22	0	27	27	0	18
18	4		9	0	10	0	23	23	0	62
Total							862	344	518	

*PDs= Person Days

Total Person days = 862

Total Hired Days = 518

Average Person days Per Hectare = 27.61

Correlation between Land Size and Total Person days = -0.45

Correlation between Land Size and Hired Person days= -0.17

Table 5.6: Output - Owner Cultivated Farms-Jaoti

Sl. No.	Sown in Rainy (ha)	Output (Qtls)	Yield ($t\ ha^{-1}$)	Sold per Qtl. (Rs.)	Gross Output (Rs.)	Total Cost (Rs.)	Profit (Rs.)	Profit Per Hect. (Rs.)	Cost Per Hect. (Rs.)
1	0.18	1.5	0.83	650	975	859	116	644	4772
2	1.25	8.25	0.66	685	5651	3767	1884	1507	3014
3	0.25	1.5	0.60	650	975	288	687	2748	1152
4	0.25	3	1.20	750	2250	454	1796	7184	1816
5	4.5	18	0.40	700	12600	14218	-1618	-360	3160
6	0.5	6	1.20	700	4200	1886	2314	4628	3772
7	0.68	6	0.88	700	4200	2116	2084	3065	3112
8	0.5	5	1.00	700	3500	1780	1720	3440	3560
9	0.25	0.9	0.36	650	585	345	240	960	1380
10	2	20	1.00	700	14000	11520	2480	1240	5760
11	1.25	13	1.04	700	9100	4113	4987	4208	3072
12	6	55	0.92	700	38500	19205	19295	3216	3201
13	8.75	40	0.46	835	33400	19102	14298	1634	2183
14	0.5	12	2.40	850	10200	2716	7484	14968	5432
15	0.62	12	1.94	750	9000	4830	4170	2230	2583
16	1.87	25	1.34	725	18125	6000	12125	6484	3209
17	1.5	14	0.93	775	10850	1908	8942	5961	1272
18	0.37	1	0.27	700	700	1683	-983	-2657	4549
	Total	242.15							

Correlation between Land Size and Yield Per Hectare = -0.27

Average Yield($t\ ha^{-1}$) = 0.78

Average Profit = Rs.2636

Benefit - Cost Ratio = 1.86

The land holding of the sample farmers varies from 0.5 to 18.75 hectares and the land cultivated during the 1999 rainy season from 0.25 to 8.25 hectares. The farmer who has put farm yard manure achieved a yield of 1.20 t ha^{-1}. The yield of farmers who did not do weeding operations was lesser than the average yield at 0.60 and 0.36 t ha^{-1} the yield of the farmers who did not do weeding operations was 0.88, 1.00, 1.04, 0.92, 0.93 t ha^{-1} and 0.27 t ha^{-1} with only farmer having a lesser than average yield. The yield of farmers who did not invest in fertilisers was 0.60, 1.20, 1.20, 2.40 and 1.94 t ha^{-1} with only farmer having a lesser yield than the average yield of 0.78 t ha^{-1}.

Table 5.7: Land Size - Yield Relationship in Jaoti owner operated Farms

Land Size (Ha)	Yield (t ha^{-1})
0.18	0.83
0.25	0.6
0.25	1.2
0.25	0.36
0.37	0.27
0.5	1.2
0.5	1.0
0.5	2.4
0.62	1.94
0.68	0.88
1.25	0.66
1.25	1.04
1.5	0.93
1.87	1.34
2	1.0
4.5	0.4
6	0.92
8.75	0.46
Average Yield	0.78

Correlation Between Land Size and Yield = -0.27

Figure No.5.1

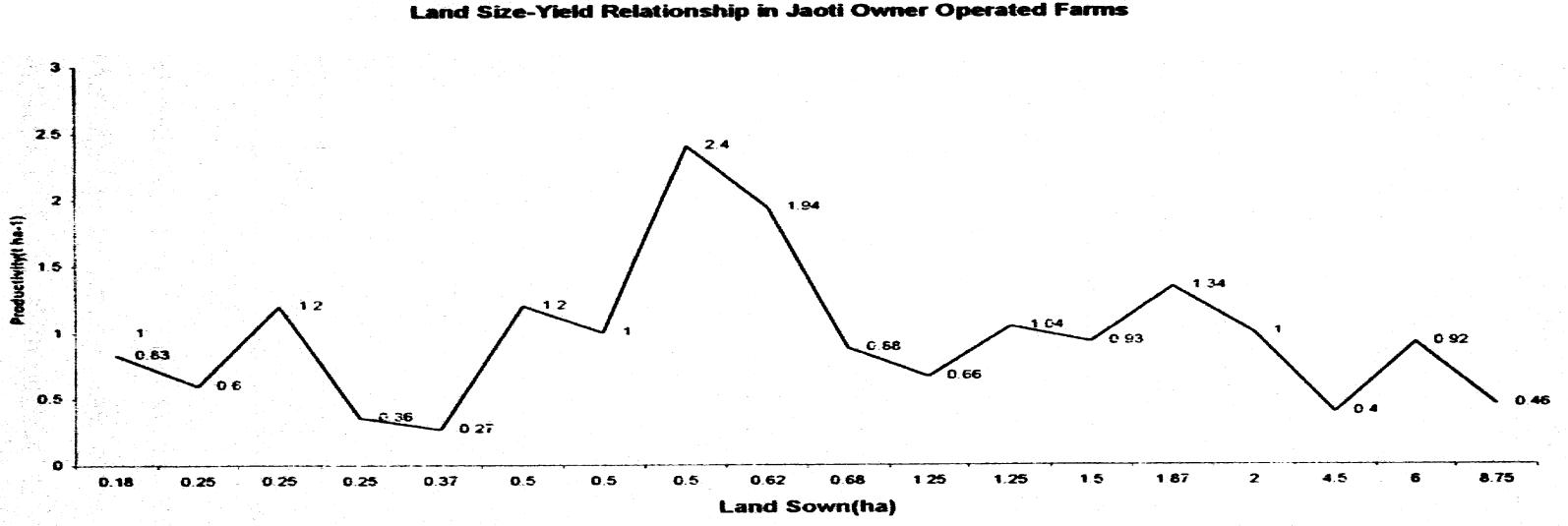

Land Size-Yield Relationship in Jaoti Owner Operated Farms
Productivity(qt ha-1)
3
2.5
2
1.5
1
0.5
0
1
0.83
0.6
1.2
0.36
0.27
1.2
1
2.4
1.94
0.68
0.66
1.04
0.93
1.34
1
0.4
0.92
0.46
0.18
0.25
0.25
0.25
0.37
0.5
0.5
0.5
0.62
0.68
1.25
1.25
1.5
1.87
2
4.5
6
8.75
Land Sown(ha)

Table 5.8: Labour Input of 5 Highest Productivity Farmers

Sl. No.	Yield ($t\ ha^{-1}$)	Total PDs per Ha^{-1}	Own PDs per Ha^{-1}	Hired PDs per Ha^{-1}	% of Own labour in Total Labour	% of Hired Labour in Total Labour	Land Size (ha)
14	2.40	194	136	58	70	30	0.50
15	1.94	219	122	97	56	44	0.62
16	1.34	73	41	32	56	44	1.87
6	1.20	56	48	8	86	14	0.50
4	1.20	112	68	44	61	39	0.25

The labour input of all the above farmers is far higher than the average which is 21.89 person days per hectare and the propotion of higher person days is also higher enabling them to escape the Marshallian inefficiency. The very high labour input of 219, 194 and 112 days are in smaller land holdings of 0.62, 0.50 and 0.25 hectares respectively

Table 5.9 : Labour Input of 5 Lowest Productivity - Jaoti Owner Operated Farmers

Sl. No.	Yield	Total Person days per Ha^{-1}	Own Person days per Ha^{-1}	Hired Person days per Ha^{-1}	% of Own labour in Total Labour	% of Hired Labour in Total Labour	FYM (Qtls)	Land Size (ha)
18	0.27	62	62	0	100	0	0	0.37
9	0.36	28	28	0	100	0	0	0.25
5	0.40	56	34	22	60	40	0	4.50
13	0.46	12	7	5	57	43	0	8.75
3	0.60	140	140	0	100	0	0	0.25

The labour input of all the above farmers except one is higher than the average person days per hectare(21.89) but the labour input of the highest productive farmers is an average of 130.8 days. The underinvestment of labour is due to the risk-averse behaviour of the farmers due to the waterlogging of the land during the sowing period.

5.3 OWNER OPERATED FARMS-KHERKHEDI

Table 5.10: Land Holding of Owner Operated Farms-Kherkhedi

Serial No.	Farmer Name	Dry Land (ha)	Irrigable Land (ha)	Total (ha)	Sown in Rainy (ha)
1	Lakhan Singh	0.5	14.5	15	4.25
2	Amol Singh	3.25	1.75	5	1.25
3	N.Singh	3.25	1	4.25	2.5
4	Sardar Singh	4.5	0.5	5	0.37
5	R.Giriraj Sharma	0.75	0.87	1.62	0.5
6	Ganesh Ram	7.5	2.5	10	2.5
7	Binay Singh	6.75	0.25	7	0.25
8	Bandel Singh	17.5	7.5	25	5
9	Hind Singh	0	3	3	3
10	Kalyan Singh	0	0.75	0.75	0.75
11	Lekhraj	0	1.12	1.12	0.62
12	Bhare Singh	3.5	0.25	3.75	0.25
	Total	47.5	33.99	81.49	21.24

The above table reveals the extent of uncultivated land among the sample farmers. With a total land holding of 81.49 hectares(of which 33.99 hectares is Irrigable) only 21.24 was taken up for cultivation in the 1999 rainy season, 60.25 hectares was left uncultivated. (73.93% of the land). The sown area entirely consists of Irrigable land.

Table 5.11: Monetised Inputs (quantity) of owner operated Farms

Sl. No.	Sowing Hired (Person Days)	Sowing Hired Tractor (Hrs)	DAP (Kgs)	FYM (Qtls.)	Weeding (Hired Person Days)	Harvesting (Hired Person Days)	Seeds Qty. (Kg.)
1	0	0	200	0	100	40	400
2	0	0	80	0	12	20	150
3	0	12	200	0	0	50	350
4	0	1	25	0	0	0	45
5	0	0	25	0	0	0	50
6	0	7	100	0	0	50	200
7	0	0	15	0	0	0	40
8	0	0	150	0	90	150	500
9	0	0	30	0	20	30	350
10	0	0	0	0	0	0	80
11	0	0	0	6.4	0	0	60
12	0	0	0	10.0	0	0	30

Correlation between Land Size and Fertiliser useage: 0.08

Table 5.12: Monetised Input Cost of Owner Operated Farms-Kherkhedi

Sl. No.	Seeds Cost (Rs.)	Hired/Own Tractor Cost (Rs.)	DAP Cost (Rs.)	Weeding Cost (Rs.)	Harvest-ing Cost (Rs.)	Thresh-ing Cost (Rs.)	Trans. Cost (Rs.)	Total Cost (Rs.)	SSP Cost (Rs.)
1	4800	960	3400	3000	3200	1260	240	19155	2295
2	1800	320	1360	240	800	560	240	5320	0
3	4200	2400	3400	0	2500	875	700	14075	0
4	540	200	425	0	0	150	0	1315	0
5	600	0	425	0	0	187	0	1212	0
6	2400	1400	1700	0	2000	450	300	8250	0
7	480	0	255	0	0	14	12	761	0
8	6000	2160	2550	3600	6000	1000	324	21634	0
9	4200	1280	2550	0	0	750	600	9380	0
10	960	0	510	0	0	1050	270	2790	0
11	720	0	0	0	0	131	105	956	0
12	360	0	0	0	0	350	150	860	0
	Total							85708	0

Average Cost of Cultivation Per Hectare: Rs. 4035

Table 5.13 : Input cost and labour Input Per Hectare-Kherkhedi Owner Operated Farms

Sl. No	Land Size (ha)	Cost of Cultivation Ha^{-1} (Rs.)	Own Person days Ha^{-1}	Hired Person days Ha^{-1}	DAP cost Ha^{-1} (Rs.)
1	4.25	4507	15	33	800
2	1.25	4256	10	26	1088
3	2.5	5630	12	20	1360
4	0.37	3554	78	0	1149
5	0.5	2424	20	0	850
6	2.5	3300	8	20	680
7	0.25	3044	52	0	1020
8	5	4327	0	48	510
9	3	3127	0	17	850
10	0.75	3720	77	0	680
11	0.62	1541	50	0	0
12	0.25	3440	56	0	0

Correlation between land size and cost of cultivation per hectare = 0.50

Correlation between land size and own days per hectare = -0.73

Correlation between Land Size and hired days per hectare = 0.93

Correlation between Land Size and DAP cost per hectare = 0.09

The positive correlation between land size and the cost of cultivation reveals that the farmer has invested inputs more on scale, the hired labour shows also an higher positive correlation. However the input of DAP is weak at 0.09, therefore the higher cost incurred has been on the higher proportion of hired labour engaged as the land size increases. The total person days of 852 involves own labour at 290 person days and hired labour engaged is 562 person days.

Table 5.14: Labour Inputs - Own and Hired-Kherkhedi

Sl. No.	Own Bullock (PDs)	Hired Bullock (PDs)	Weeding Own (PDs)	Weed. Hired (PDs)	Harvest Own (PDs)	Harvest Hired (PDs)	Total Person Days	Total Own Days	Total Hired Days	Person days per Hectare
1	0	0	30	100	32	40	202	62	140	48
2	0	0	5	12	18	20	55	23	32	44
3	0	0	15	0	15	50	80	30	50	32
4	3	0	14	0	12	0	29	29	0	78
5	0	0	5	0	5	0	10	10	0	20
6	20	0	0	0	0	50	70	20	50	28
7	2	0	6	0	5	0	13	13	0	52
8	0	0	0	90	0	150	240	0	240	48
9	0	0	0	20	0	30	50	0	50	17
10	6	0	40	0	12	0	58	58	0	77
11	5	0	16	0	10	0	31	31	0	50
12	2	0	8	0	4	0	14	14	0	56
Total							852	290	562	

Average Person days Ha^{-1} = 40

Correlation between land size and total person days Ha^{-1} = -0.32

Correlation between land size and hired person days Ha^{-1} = 0.92

Table 5.15: Output - Owner Cultivated Farms-Kherkhedi

Sl. No.	Sown in Rainy Season (ha)	Output (Qtls)	Yield ($t\ ha^{-1}$)	Sold for (Rs.)	Gross Output (Rs.)	Total Cost (Rs.)	Profit (Rs.)	Profit Ha^{-1}. (Rs.)	Cost Ha^{-1} (Rs.)
1	4.25	30	0.71	700	21000	19155	1845	434	4507
2	1.25	14	1.12	800	11200	5320	5880	4704	4256
3	2.5	25	1.00	700	17500	14075	2545	1018	5982
4	0.37	4	1.08	750	3000	1315	1685	4554	3554
5	0.5	5	1.00	750	3750	1212	2538	5076	2424
6	2.5	10	0.40	750	7500	8250	-750	-300	3300
7	0.25	0.4	0.12	700	280	761	-481	-1924	3044
8	5	25	0.50	800	20000	21634	-1854	-371	4371
9	3	20	0.67	750	15000	9380	5620	1873	3127
10	0.75	9	1.20	750	6750	2790	3960	5280	3720
11	0.62	3.5	0.56	750	2625	956	1669	2692	1542
12	0.25	5	2.00	750	3750	860	2890	11560	3440
		Avg.	0.71					1255	4035

Correlation between Land Size and Yield Per Hectare = -0.38

Average Yield($t\ ha^{-1}$) = 0.71

Benefit - Cost Ratio = 1.31

Average Cost of Cultivation = Rs.4035

Average Profit Per hectare = Rs. 1255

Table 5.16: Land Size - Yield Relationship in Kherkhedi Owner operated farms

Land Size	Yield(t ha^{-1})
4.25	0.12
1.25	2
2.5	1.08
0.37	1
0.5	0.56
2.5	1.2
0.25	1.12
5.0	1
3.0	0.4
0.75	0.67
0.62	0.71
0.25	0.5

Figure 5.3
Land Size - Yield Relationship in Kherkhedi Owner operated farms

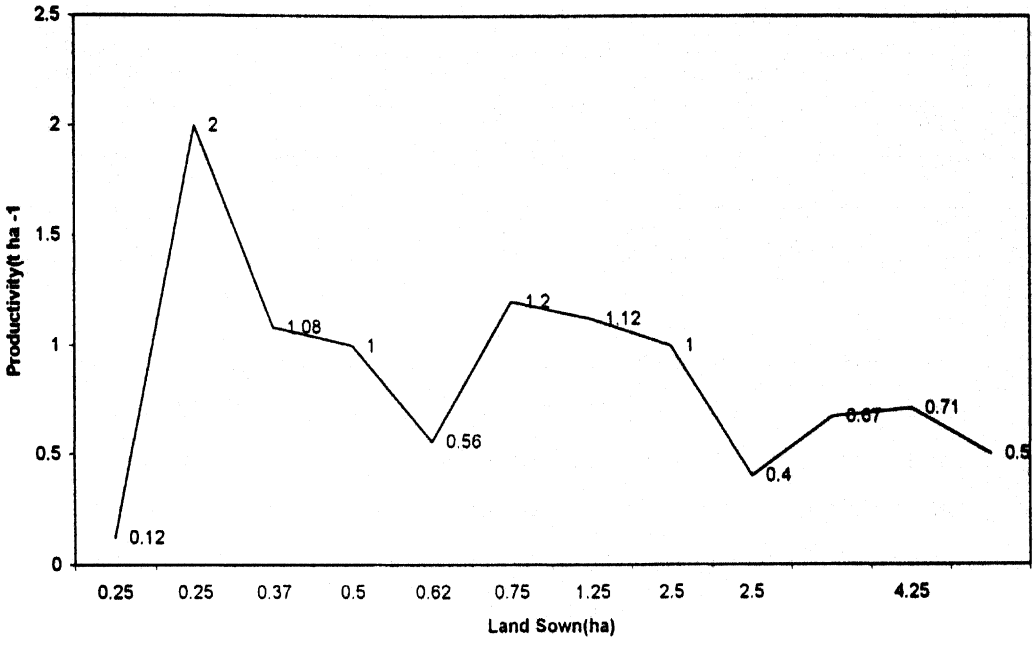


Table 5.17: Labour and FYM Input of 5 Highest Productivity Farmers- Kherkhedi

Sl. No.	Yield	Total PDs Ha^{-1}	Own PDs Ha^{-1}	Hired PDs Ha^{-1}	% of Own labour in Total Labour	% of Hired Labour in Total Labour	FYM (Qtls)	Land Size (ha)
12	2.00	56	56	0	100	0.00	6.40	0.25
10	1.20	77	77	0	100	0.00	0	0.75
2	1.12	36	10	26	27.77	72.23	0	1.25
4	1.08	78	78	0	100	0.00	0	0.37
5	1.00	20	20	0	100	0.00	0	0.5

The highest yield achieved of 2.00 t ha^{-1} had an important input application, 6.40 quintals of FYM without the application of any fertiliser. The labour input of four of the five highest productive farmers in kherkhedi involved all the labour input being done by the owner and his family and therefore was able to escape the Marhsallian inefficiency. The average labour input for three of the above farmers is higher than the average of 40 days per hectare, while for two farmers it as lesser than the average. However one should taken into account the farmers with the higher input of 77, and 56 days per hectare were smaller size at 0.37, 0.25 hectares. A contrasting example is the farmer (sl.no.5) who has a yield of 1.00 t ha^{-1} with labour input of 20 days per hectare

Table 5.18 : Labour Input of 5 Lowest Productivity Farmers- Kherkhedi

Sl. No.	Yield (t ha^{-1})	Total PDs Ha^{-1}	Own PDs Ha^{-1}	Hired PDs Ha^{-1}	% of Own labour in Total Labour	% of Hired Labour in Total Labour	FYM (Qtls)	Land Size (ha)
7	0.12	52	52	0	100	0	0	0.25
6	0.40	28	8	20	28.57	71.43	0	2.5
8	0.50	48	0	48	0	100	0	5.0
11	0.56	50	50	0	100	0	0	0.62
9	0.67	17	0	17	0	100	0	3.0

The labour input of three of the above farmers is higher than the average 40 days per hectare and two farmers have only own labour as total input of labour. Two farmers have a lesser intensity at 17 and 28 days per hectare. The reduction in the yield of the above farmers does not owe due to differential labour inputs but due to the waterlogging of their fields in the sowing period in July 1999.

The land holding of the sample farmers varies from 0.75 to 25 hectares, the land cultivated during the 1999 rainy season varies from 0.37 to 5 hectares. The two farmers who did not use fertilisers, but used FYM had contrasting yields of 0.56 t ha^{-1} and 2.00 t ha^{-1}. The three farmers who did not do weeding operations had yield lesser than the average yield - 0.40 , 0.50 and 0.67 t ha^{-1}.

5.4 KUNDHANKHEDI OWNER OPERATED FARMS

Table 5.19: Land Holding of Owner Operated Farmers-Kundhankhedi

Serial No.	Farmer Name	Dry Land (ha)	Irrigable Land (ha)	Total (ha)	Sown in rainy season (ha)
1	Viren Singh	4.5	3	7.5	3
2	Girvar Singh	1.75	0.75	2.5	0.5
3	Gajraj Singh	0	1	1	1
4	Amreet Singh	0	3.75	3.75	3.75
5	Ram Prasad	0.5	1.25	1.75	1.25
6	Kamal Singh	4	2.25	6.25	2.25
7	Amol Singh	31.25	6.25	37.5	3.75
8	Rastid	8.75	0	8.75	2.5
9	P.Singh	6.25	2	8.25	2
Total		57	20.25	77.25	20

The total land holding of the 9 farmers which constitutes the total population of the Owner operated farmers in the village is 77.25 hectares of which 20.25 is Irrigable of which 20 hectares were cultivated during the 1999 Rainy season with the rest 57 hectares left uncultivated.

Table 5.20: Monetised Inputs(qty) of Owner Operated Farms

Sl. No.	Seeds (Kg.)	Sowing Hired Person Days	Sowing Hired Tractor Hours	DAP (Kgs)	FYM (Qtls)	Weeding Hired Person Days	Harvesting Hired Person Days
1	300	0	6	150	0	35	38
2	50	0	0	0	0	0	0
3	100	0	0	0	0	0	0
4	300	0	7	0	0	0	0
5	110	0	0	50	0	0	0
6	600	0	0	50	0	0	0
7	300	0	0	150	0	80	35
8	125	0	0	150	0	33	30
9	200	0	0	100	0	0	0

Correlation between Land Size and Fertiliser useage: 0.30

Table 5.21: Monetised Input Cost of Owner Operated Farms.

Sl. No.	Seeds Cost (Rs.)	Hired/Own Tractor Cost (Rs.)	DAP Cost (Rs.)	Weeding cost (Rs.)	Harvesting Cost (Rs.)	Threshing Cost (Rs.)	Trans. Cost (Rs.)	Total Cost (Rs.)
1	3600	1200	2550	1050	1520	1275	900	12095
2	600	0	0	0	0	80	60	740
3	1200	0	0	0	1600	180	135	3115
4	3600	1400	0	0	0	844	675	6519
5	1320	0	850	0	0	140	105	2415
6	7200	0	850	0	0	1200	900	10150
7	3600	0	2550	2400	1050	640	480	10720
8	1500	0	2550	990	900	480	360	6780
9	2400	0	1700	0	0	510	360	4970

Average Cost of Cultivation: Rs.3293 ha^{-1}

Table 5.22: Per Hectare Costs- Khekhedi Owner operated farms

Sl.No	Land Size (ha)	Cost of Cultivation ha^{-1} (Rs.)	Own Man Days ha^{-1} (Rs.)	Hired Man ha^{-1} (Rs.)	DAP cost Ha^{-1} (Rs.)
1	3	4032	12	24	850
2	0.5	1480	12	0	0
3	1	3115	26	0	0
4	3.75	1738	6	11	0
5	1.25	1932	19	0	680
6	2.25	4511	13	27	378
7	3.75	2859	30	31	680
8	2.5	2712	16	25	1020
9	2	2485	4	0	850

Correlation between land size and cost of cultivation per hectare = 0.24

Correlation between land size and own days per hectare = -0.03

Correlation between Land Size and hired days per hectare = 0.58

Correlation between Land Size and DAP cost per hectare = 0.30

The correlation between land size and the cost of cultivation is not significant (0.24) therefore reflecting that as the land size increases the farmer is risk-averse as does not incur higher proportionate investment costs, the input correlation of DAP is not significant at 0.30 . However the hired labour shows a positive correlation (0.58) signifying that increased land size requires the minimum amount of labour especially during peak seasons like harvesting and threshing and this cost has to be incurred. Out of a total person days of 710, only 189 person days was own labour with the rest 521 days being hired labour.

Table 5.23: Labour Inputs - Own and Hired (Person days)

Sl. No.	Own Bullock (PDs)	Hired Bullock (PDs)	Weeding Own (PDs)	Weed. Hired (PDs)	Harvest Own (PDs)	Harvest Hired (PDs)	Total Person Days (PDs)	Total Own Days (PDs)	Total Hired Days (PDs)	Person Days Per Hectare
1	0	0	0	35	0	38	73	0	73	24
2	2	0	0	0	4	0	6	6	0	12
3	2	0	20	0	24	0	46	46	0	46
4	0	0	0	0	24	40	64	24	40	17
5	0	0	20	0	24	0	44	44	0	35
6	0	0	5	60	30	0	95	35	60	43
7	2	0	5	80	30	35	152	37	115	41
8	8	0	5	33	0	100	146	13	133	59
9	8	0	5	0	0	100	113	13	100	56
Total							739	189	521	

Average Person days Per Hectare = 36.95

Correlation between Land Size and Total Person days Per Hectare = 0.30

Correlation between Land Size and Hired Person days Per Hectare= 0.58

Table 5.24: Output - Owner Cultivated Farms-Kundhankhedi

Sl. No.	Sown in Rainy Season (ha)	Output (Qtls)	Yield (t ha^{-1})	Sold per Qtl. (Rs.)	Gross Output (Rs.)	Total Cost (Rs.)	Profit (Rs.)	Profit per Hect. (Rs.)	Cost Per Hect. (Rs.)
1	3	30	1.00	850	25500	12095	13230	4410	4090
2	0.5	2	0.40	800	1600	740	860	1720	1480
3	1	4.5	0.45	800	3600	1515	2085	2085	1515
4	3.75	22.5	0.60	750	16875	8119	8756	2335	2165
5	1.25	3.5	0.28	800	2800	2415	385	308	1932
6	2.25	30	1.33	800	24000	10325	13675	6078	4589
7	3.75	16	0.43	800	12800	11470	1330	355	3059
8	2.5	12	0.48	850	10200	10045	155	62	4018
9	2	12	0.60	750	9000	8970	30	15	4485
	Total	242.15							

Correlation between Land Size and Yield Per Hectare = 0.27

Average Yield (t ha^{-1}) = 0.66

Benefit - Cost Ratio = 1.84

Average Cost of Cultivation = Rs.3285 Ha^{-1}

Average Profit = Rs. 2444 Ha^{-1}

Table 5.25: Land Size - Yield Relationship in Kundhankhedi Owner Operated Farms

Land Size (ha)	Yield (t ha^{-1})
0.25	0.12
0.25	2
0.37	1.08
0.5	1
0.62	0.56
0.75	1.2
1.25	1.12
2.5	1
2.5	0.4
3	0.67
4.25	0.71
5	0.5

Land Size-Yield Correlation = 0.27

Figure 5.4

ıtionship in Kundhankhedi Operated Farms

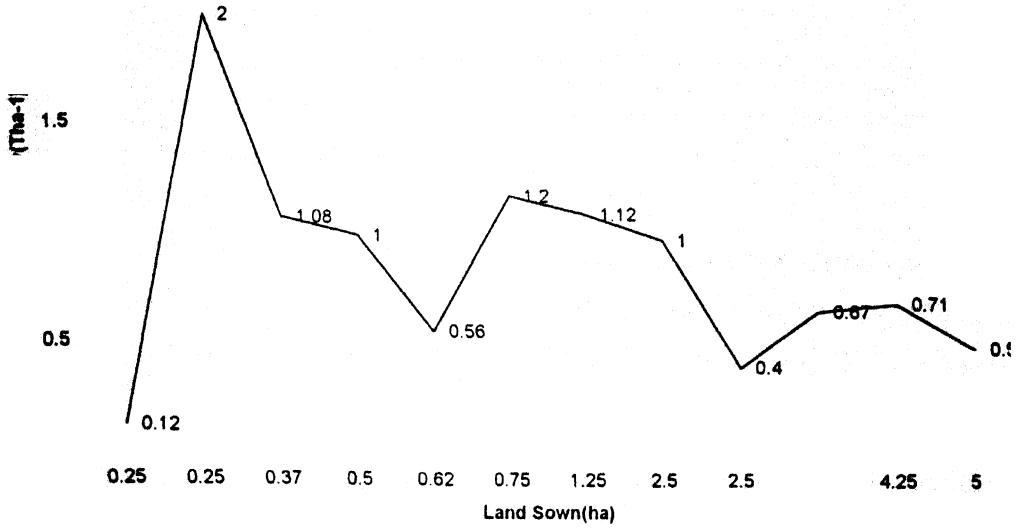


Table 5.26: Labour Input of 2 Highest Productivity - Kundhankhedi Owner Operated Farmers

Sl. No.	Yield (t ha^{-1})	Total PDs Ha^{-1}	Own PDs Ha^{-1}	Hired PDs Ha^{-1}	% of Own labour in Total Labour	% of Hired Labour in Total Labour	FYM (Qtls)	Land Size (ha)
6	1.33	43	16	27	32.5	67.5	0	2.25
1	1.00	36	12	24	33.33	66.67	0	3.00

Table 5.27: Labour and FYM Input of 5 Lowest Productivity - Kundhankhedi Owner Operated Farmers

Sl. No	Yield (t ha^{-1})	Total PDs Ha^{-1}	Own PDs Ha^{-1}	Hired PDs Ha^{-1}	% of Own labour in Total Labour	% of Hired Labour in Total Labour	FYM (Qtls)	Land Size (ha)
5	0.28	19	19	0	100	0	0	1.25
2	0.40	12	0	0	100	0	0	0.5
7	0.43	61	30	31	49	51	0	3.75
3	0.45	26	26	0	100	0	0	1.00
8	0.48	59	16	21	39	61	0	2.5

The higher input intensity of labour among Kundhankhedi farmers has not been a contributing factor in the differential productivity across the farmers. The highest productivity achieved of 1.33 T $^{ha-1}$ was with a labour input of 43 days per hectare of which only 32.5% compromised own labour.

The total land holding of the sample farmers varied from 1 to 37.5 hectares and the land cultivated during the 1999 rainy season varied from 0.5 to 3.75 hectares. The yield of the three farmers who did not input fertilisers was less than the average yield - 0.40 , 0.45 T $^{ha-1}$ and 0.60 T $^{ha-1}$. The yield of the two farmers who did not do weeding operations was 1.00 t ha^{-1} and 0.40 t ha^{-1}.

Table 5.28: ICRISAT Trial Farmers- Owner Operated

Sl. No	Name	Land Size (ha)	Yield Per Hectare ($t\ ha^{-1}$)
1	Kamal Singh	3.5	1.60
2	Lakshman	2.5	1.52
3	Narayan	3.75	0.67
4	Hari	2.5	1.20
5	Zandel	3.75	1.47
6	Dal	2.5	1.20
7	Harnath	1.75	1.37
8	Kripal	1.5	1.20
9	Pervez	1.5	1.60
10	Bania	1.5	0.90
11	Pahelwan	3.75	0.51
12	Vishan	1.5	0.93
13	Hare Singh	3.75	0.80

Average Yield = 1.1 $t\ ha^{-1}$

Correlation between Land Size and Productivity per hectare = -0.39.

5.5 SUMMARISED RESULTS AND ANALYSIS-OWNER OPERATED FARMS

Table 5.29: Land Holding - Owner Operated Farms

Sl. No.	Village	Dry (ha)	Irrigable (ha)	Total (ha)	Sown in Rainy Season 1999	Sample Size
1	Jaoti	68.06	30.62	98.68	31.22	18
2	Kherkhedi	47.5	33.99	81.49	21.24	12
3	Kundhankhedi	57.0	20.25	77.25	20.00	9
	Total	172.56	84.86	257.42	72.46	39

Table 5.30: Land Utilisation of Owner Operated Farms

Village	Sample Size	Total Land (ha)	Irrigable Land	Sown (ha)	% of sown area Irrigable	% of total area uncultivated
Jaoti	18	96.68	30.62	31.22	98.07	67.46
Kherkhedi	12	81.49	33.99	21.24	92.93	73.93
Kundhankhedi	9	77.25	20.25	20.00	98.76	73.78

Table 5.31: Correlation between Land Size and Variables

Sl. No.	Village	Fertiliser use	Total Person days	Hired Man Days	Yield
1	Jaoti	0.22	-0.45	-0.17	-0.27
2	Kherkhedi	0.08	-0.32	0.92	-0.38
3	Kundhankhedi	0.30	0.30	0.58	0.27
	Average	0.17	-0.37		-0.26

Table 5.32: Correlation between Land Size and Variables-Owner Operated Farms

Sl. No.	Village	Cost of Cultivation (Rs.)	Yield ($t\ ha^{-1}$)	B-C Ratio	Average Profit (Rs.)	Loss Making Farmers	Loss Amount (Rs.)
1	Jaoti	3100	0.78	1.86	2636	2	3017
2	Kherkhedi	4035	0.71	1.31	2444	3	3085
3	Kundhankhedi	3285	0.66	1.84	2166	0	0
	Average		0.72		2045		
	Total					5	6102

Average Yield = 0.72 T^{ha-1}

Average Cost of Cultivation = Rs.3320

Average Profit = Rs. 2045

Average Benefit Cost Ratio = 1.65

Land Utilisation- The sown area in Jaoti, Kherkhedi and Kundhankhedi consists predominantly of Irrigable land, 98.07%, 92.23% and 98.76% respectively signifying that the soybean crop is predominantly grown on Irrigable land because of the variability of the monsoons is high. The %age area uncultivated is predominantly dry land, which is 67.46%, 73.93% and 73.78% respectively. The dry land farmers in the study villages in the rainy season do not prefer to cultivate and instead prefer to lease-out to share croppers, as is the case in Jaoti village. This has important implications as the farmers prefer to grow soybean in Irrigable area, the intervention strategy to reach out to dry land farmers who leave the land uncultivated in the rainy season needs to be considered. The development of drought resistant varieties water management practices and the demonstration of optimum input practices would help in the increase in the area cultivated, the availability in the land-lease market would increase. However the need for equitable share cropping contracts is important, the evidence is examined in the next chapter (Chapter 6) and the policy implications in the last chapter (Chapter 7).

Productivity- The average productivity among the 39 farmers is 0.72 t ha^{-1}. The productivity in Jaoti, Kherkhedi and Kundhankhedi villages is 0.78, 0.71 and 0.66 t ha^{-1} respectively in comparison to ICRISAT trial farmers who have an average productivity of 1.11 t ha^{-1} . The productivity of farmers ranges from 0.12 t ha^{-1} to 2.40 t ha^{-1} .

The highest yield of by the farmer in Jaoti in 0.5 hectares of Irrigable land, involved no input of fertilisers (compared to the average of 46 Kgs) with cost of cultivation of Rs.5432 per hectare (against the average of Rs.3100. The labour input was 136 days per hectare of which 70% comprised of own labour which was highest among all owner operated farmers. In comparison the lowest yield of 0.12 t ha^{-1} sown in 0.25 hectare of Irrigable land involved application of 15 Kg. of DAP with no weeding undertaken at cost of cultivation of Rs.3044. The labour input was 54 person days, which was entirely of the farmer and his family.

The yield of the farmers who utilised Farm yard manure is as follows.

Table 5.33: Yield of Farmers with FYM Input

Sl. No.	Village	Area (ha)	FYM (Qtls)	Yield ($t\ ha^{-1}$)
4	Jaoti	0.25	9.60	1.20
11	Kherkhedi	0.62	6.4	0.56
12	Kundhankhedi	0.25	10.0	2.00

Land Size-Productivity Relationship: The relationship is found to be inverse with the overall correlation being -0.27 with the correlation for Jaoti and Kherkhedi being -0.27 and -0.38 however in Kundhankhedi village the correlation was found positive at 0.27. Among ICRISAT trial farmers the relationship has been found inverse and the correlation is -0.36.

Fertilisers: The relationship between Land Size and fertiliser useage is positively correlated but is not significant at 0.17. The correlation for the three villages Jaoti Kherkhedi and Kundhankhedi is 0.22, 0.08 and 0.30.

Labour: The relationship between land size and labour days invested in cultivation an hectare of land is found to inversely related with the correlation being -0.37. The correlation for Jaoti and Kherkhedi being -0.45, -0.32, however for Khundhankhedi the relation is found positive at 0.30, but not significant.

The productivity of the five highest productive farmers in Jaoti involved an average labour input of 130.8 person days per hectare(own labour-63.45%), compared to 21.89 days among the five lowest productive farmers of which 90.93% compromised of own labour. The productivity of the five highest productive farmers in Kherkhedi involved an average labour input of 85.57 man-days of which 90.26% consisted of own labour. The average labour input of the five lowest productive farmers involved an average of 17.15 days per hectare of which 56.41 % consisted of own labour. The productivity of the two highest productive farmers in Kundhankhedi involved input of 43 and 36 days per hectare compared to 19 and 21 days for the lowest productive farmers.

The rationale for the farmers in the sample villages is due to the performance of an important variable - Rainfall, and in this case in the 1999 rainy season the problem was of excess, particularly during the sowing period. The farmers report that it rained continuously for two days around June 20th, 1999. An important determining factor therefore was the slope and drainage of the land in escaping from waterlogging. The risk averse farmer therefore consciously under-invests his inputs to minimise his risk. Among the sample of 39 farmers, 5 farmers suffered losses amounting to Rs. 5196 without adding the imputed market value of their own family labour. Rosensweig and Binswanger (1993) in their study attribute the risk-aversiveness in smaller farmers with fewer assets, which is due to the lesser ability for them in obtaining post-ante consumption smoothing mechanisms.

Profit per Hectare: The average Profit per hectare is Rs.2045 with the profit in the above three villages being Rs 2636, Rs.2444 and Rs.2166 respectively.As reported above 5 farmers have suffered losses amounting to Rs. 6102 in total.

The relationship between land size and productivity is found inverse with a negative correlation of -0.27 providing additional support for the existence of the inverse returns to scale relationship. ICRISAT trial farmers due to better input practices have been able to attain better yield of 1.1 t ha^{-1} but have not been able to escape the inverse returns phenomenon which has became endemic in Indian agriculture. The role played by the monsoon rains has proved to be an important factor and in this particular year, excess of it has caused the variability among the yield of the farmers and the waterlogging potentiality of the land has been an important determinant. The farmers who have underinvested inputs had done so voluntarily to minimise the risks. This factor has a significant variable has been recognised in an earlier study by Rosenszweig and Binswanger(1993) in a study of 10 ICRISAT study villages using data for ten years from 1975-76 and recommendations are offered.

The policy implications due to the above problem and intervention strategies for the stakeholders, ICRISAT and BAIF are examined in the policy chapter (Chapter No.7).

CHAPTER 6

SHARE CROPPER OPERATED FARMS

A large propotion of of land holdings(79.4%) in Vidisha district are reported to be leased-in with only, 1.7% classified as wholly owned and self operated with 18% classified as 'otherwise operated', which refers to cultivation on government and the common land (GOMP, 1998). This reflects the presence of an inequitable land holding structure, which encourages the active operation of the lease market. The study examines the productivity of soybean grown by the share croppers and the profitability for the owner operated and share cropper farms are compared.

The study involved the collection of data from 37 share croppers in three villages. There are three forms of share cropping in these villages.

1. 20-80: Under this contract, the landlord undertakes the activities of sowing the seeds and the share cropper undertakes application of fertilisers and the rest of the activities. The output is shared in the 20:80 ratio between the Share cropper and landlord respectively. There are 8 share croppers under this contract in the sample.

2. 33-66: All the activities are undertaken by the share cropper and the monetised costs are shared in the 33:66 ratio and so is the output between the Share cropper and landlord. The landlord does the seeds and fertilisers investment and the cost is shared. Twenty share croppers are under this contract in the sample

3. 50-50: All the activities are undertaken by the share cropper and the monetised costs are shared in the 50:50 ratio and so is the output between the Share cropper and landlord. The landlord does the seeds and fertilisers investment and the cost is shared. Nine among the sampled share croppers are under this contract.

The supervision of the share croppers by the landlords is done intensively. The landlord does the investment of seeds and fertilisers initially. The labour inputs in terms of hired labour to be engaged is decided mutually. The landlord periodically

visits the plots and instructions are issued to the tenant for accomplishment of activities within a given time.

The duration of the lease period normally does not exceed two consecutive seasons. Although leasing is prohibited in Madhya Pradesh, its enforcement is non-existent, but farmers due to risk-averse behaviour do not take risks and shift the tenants periodically. The emergence of the 20:80 contract wherein the landlord undertakes the sowing and fertiliser operation should be seen under this risk-aversive behaviour of the landlord to escape the 'tiller is the owner' legislation. This contract is usually between the small and marginal farmers who do not have capital and only they have their labour to offer.

The resource adjustment due to inequitable resource endowment, inequitable distribution of land holding and the banning of tenancy has helped in the emergence of the 20:80 contract. The 33:66 contract is also a mechanism for resource adjustment between the better endowed landlord and the less endowed tenant. The 50:50 contract is perceived by the land lords and even the share croppers as one which leads to a loss to the landlord has he has to share a greater propotion of the outupt. Under this contract, generally the tenant is obliged to loan without interest to the landlord . Only the principal is returned when the share cropper does not do any further leasing-in. Another reason is the non-availability of draft power with the landlord.

The village-wise information is as follows. The source for the tables are primary data.

6.1 JAOTI SHARE CROPPERS

Table 6.1: Land Leased by Jaoti Share Croppers

Sl. No.	Share Cropper's Name	Dry Land (ha)	Irrigable Land (ha)	Sown in Rainy season (ha)
1	S. Ram	1.25	0.00	1.25
2	G. Bishkarma	1.25	0.00	1.25
3	Kallu	3.75	0.00	3.75
4	Jagdish	2.5	0.00	2.5
5	Chintulal	0.5	0.00	0.5
6	Lala Ram	1.25	0.00	1.25
7	Gajraj Singh	0.75	0.00	0.75
8	Babu Lal	3.00	0.00	3.00
9	Ram Lal	0.50	0.00	0.50
10	Kancheri	0.25	0.00	0.25
11	Prakash	2.00	0.00	2.00
12	D. Singh	1.25	0.00	1.25
13	Bharat Singh	0.00	0.75	0.75
14	Ganga Ram	2.00	0.00	2.00
15	Kallu	0.00	1.50	1.50
16	Shivnarayan	0.00	1.25	1.25
17	Bansi Lal	1.25	0.00	1.25
18	Hariram	2.50	0.00	2.50
19	Ram Singh	1.25	0.00	1.25
20	Nathu	1.75	0.00	1.75
	Total	30.25	3.5	30.5

Source: Primary data (for all the tables).

The Sample Share Croppers in Jaoti leased in 33.75 hectares of which 30.5 hectares were sown. 18 of the 20 farmers leased in dry land, this land is cultivated only in the rainy season and for the rest of the year is left uncultivated.

Table 6.2 : Own Land Holding of Jaoti Share Croppers

Sl. No.	Share Cropper's Name	Own Land Dry (ha)	Own Land Irrigable (ha)
1	S. Ram	1.75	0
2	G. Bishkarma	0	0
3	Kallu	0	0
4	Jagdish	0	0
5	Chintulal	0.37	0
6	Lala Ram	0	0
7	Gajraj Singh	0.75	0
8	Babu Lal	0	0
9	Ram Lal*	4.00	0
10	Kancheri	0	0
11	Prakash	0	0
12	D. Singh	0	0
13	Bharat Singh	1.75	1.00
14	Ganga Ram	0	0
15	Kallu	0	0
16	Shivnarayan	0	0
17	Bansi Lal	0	0
18	Hariram	1.62	0
19	Ram Singh	0	0
20	Nathu	0	0
	Total	10.24	1.00

* Leased out own land for two years for Rs.40,000.

Table 6.3: Credit and Labour Transactions with the Landlord

Sl. No.	Share Cropper's Name	Amount Borrowed (Rs.)	Interest Rate (%)	Wheat Borrowed (Kg.)	Wheat Returned (Kg.)	Amount Loaned-to Landlord Without Interest (Rs.)	Works in the Landlord's Own Land
1	S. Ram	0	0	0	0	0	No
2	G. Bishkarma	2000	36	0	0	0	No
3	Kallu	0	0	0	0	0	No
4	Jagdish	0	0	0	0	0	No
5	Chintulal	1500	36	100	125	0	No
6	Lala Ram	1500	36	150	190	0	No
7	Gajraj Singh	1000	0	0	0	0	No
8	Babu Lal	0	0	0	0	0	No
9	Ram Lal	3000	36	0	0	0	Yes
10	Kancheri	3000	36	150	225	0	No
11	Prakash	0	0	0	0	0	Yes, without wages
12	D. Singh	20000	36	0	0	0	No
13	Bharat Singh	2000	36	500	750	0	No
14	Ganga Ram	0	0	0	0	0	Yes, without wages
15	Kallu	0	0	0	0	1500*	No
16	Shivnarayan	0	0	0	0	0	No
17	Bansi Lal	0	0	500	600	0	No
18	Hariram	8000	36	0	0	0	No
19	Ram Singh	1000	36	0	0	0	No
20	Nathu	0	0	0	0	0	No

* 50:50 share cropping contract.

Ten share croppers took cash loans at 36% interest from the landlord and five farmers among them also borrowed wheat. The loans are incurred during the sowing period in the third week of July and returned after the sale of the output, which is completed by the third week of October.

Table 6.4: Monetised Input Quantity of Share Cropper Operated Farms

Sl. No.	Seeds (Kg.)	Sowing Hired Tractor Hours	DAP (Kgs)	Weeding Hired PDs	Harvesting Hired PDs	Seed Kg. Ha^{-1}	DAP Kg. Ha^{-1}
1	100	3	50	33	18	80	64
2	100	6	0	0	0	80	61
3	300	15	150	0	0	80	21
4	250	5	100	0	20	100	40
5	50	0	25	0	9	100	200
6	150	0	75	13	0	120	96
7	65	4.5	30	10	14	87	116
8	300	0	50	0	40	100	33
9	80	0	40	0	20	160	320
10	20	0	20	0	0	80	320
11	165	0	75	18	34	83	41
12	110	0	50	30	5	88	70
13	100	0	100	0	0	133	178
14	150	0	75	0	28	75	38
15	150	0	75	0	0	100	67
16	150	0	50	0	0	120	96
17	150	0	50	0	0	120	96
18	225	3	0	16	0	90	36
19	125	3	50	0	0	100	80
20	150	2	50	0	0	86	49

Correlation between Land Size and Fertiliser(DAP) useage = -0.45

Average DAP Input Per Hectare = 36.55 Kg..

Table 6.5 : Monetised Input Cost of Share Cropper Operated Farms (Jaoti)

Sl. No	Seeds Cost (Rs.)	Hired Tractor Cost (Rs.)	DAP Cost (Rs.)	Weeding Cost (Rs.)	Harvest Cost (Rs.)	Thres. Cost (Rs.)	Transport Cost (Rs.)	Total Cost (Rs.)
1	1200	450	850	1000	720	725	300	5245
2	1200	1200	0	1000	500	147	210	4257
3	3600	3000	2550	0	0	528	660	10338
4	3000	3000	1700	0	800	216	270	8986
5	600	0	425	0	450	168	210	1853
6	1800	0	1275	390	1000	384	480	5329
7	780	900	510	300	560	135	180	3365
8	3600	0	850	0	1600	135	180	6365
9	960	0	680	0	400	143	150	2333
10	240	0	340	0	0	0	23	603
11	1980	0	1275	540	1020	504	630	5949
12	1320	0	850	900	200	225	300	3795
13	1200	0	1700	0	0	42	60	3002
14	1800	0	1275	0	0	353	360	3788
15	1800	0	1275	0	0	120	150	3345
16	1800	0	850	0	800	192	240	3882
17	1800	0	850	0	0	113	150	2913
18	2700	600	0	480	100	126	210	4216
19	1500	600	850	0	0	42	60	3052
20	1800	400	850	0	0	54	90	3194

Average Cost of Cultivation: Rs.2813

Average Cost of Cultivation for Landlord: Rs. 1726

Average Cost of Cultivation for Share Cropper: 1087

Table 6.6: Labour Input - Own and Hired for Jaoti Share Croppers

Sl. No.	Own Bullock (PDs)	Hired Bullock (PDs)	Weed. Own (PDs)	Weed. Hired (PDs)	Harvest Own (PDs)	Harvest Hired (PDs)	Total PDs	L.L. PDs	S.C PDs	PDs Per Ha^{-1}
1	0		0	33	0	14	47	0	69	55
2	0		0	33	0	10	43	0	33	26
3	0		0	0	42	0	42	0	42	11
4	0		0	0	0	20	20	0	20	8
5	5		12	0	2	9	28	0	28	56
6	6		12	13	2	0	33	0	33	26
7	0		10	10	3	14	37	0	37	49
8	8		0	0	2	40	50	0	50	17
9	4		2	0	2	20	28	0	28	56
10	4		5	0	10	0	19	0	19	76
11	6		0	18	0	34	58	0	58	29
12	6		15	30	0	5	56	0	56	45
13	6		10	0	8	0	24	0	24	32
14	2		40	0	35	28	105	0	105	52
15	4		0	0	3	3	10	0	12	8
16	4		0	0	20	0	24	0	24	19
17	4		0	0	20	0	24	0	24	19
18	0		10	0	20	0	30	0	30	12
19	4		28	0	29	0	61	0	61	49
20	0		24	0	24	0	48	0	48	27
	Total						787	0	799	

Total Person days = 787

Share Cropper Person days = 787

Land Lord Person days = 0

Average PDs per Hectare = 25.80

Average S.C. Person days Per Hectare = 25.80

Average L.L Person days Per Hectare = 0.00

Table 6.7: Land Size- Yield Relationship among Jaoti Share Cropped Farms (in ascending order of land size)

Land Size (ha)	Yield ($t\ ha^{-1}$)
0.25	0.30
0.5	1.40
0.5	1.00
0.75	0.80
0.75	0.27
1.25	0.80
1.25	0.56
1.25	1.28
1.25	0.80
1.25	0.64
1.25	0.4
1.25	0.16
1.5	0.33
1.75	0.17
2	1.05
2	0.60
2.5	0.36
2.5	0.28
3	0.20
3.75	0.59
Avg. Yield	0.54

Correlation between Land Size and Yield = -0.30

Figure 6.1

Land Size- Yield Relationship among Jaoti Share Cropped Farms

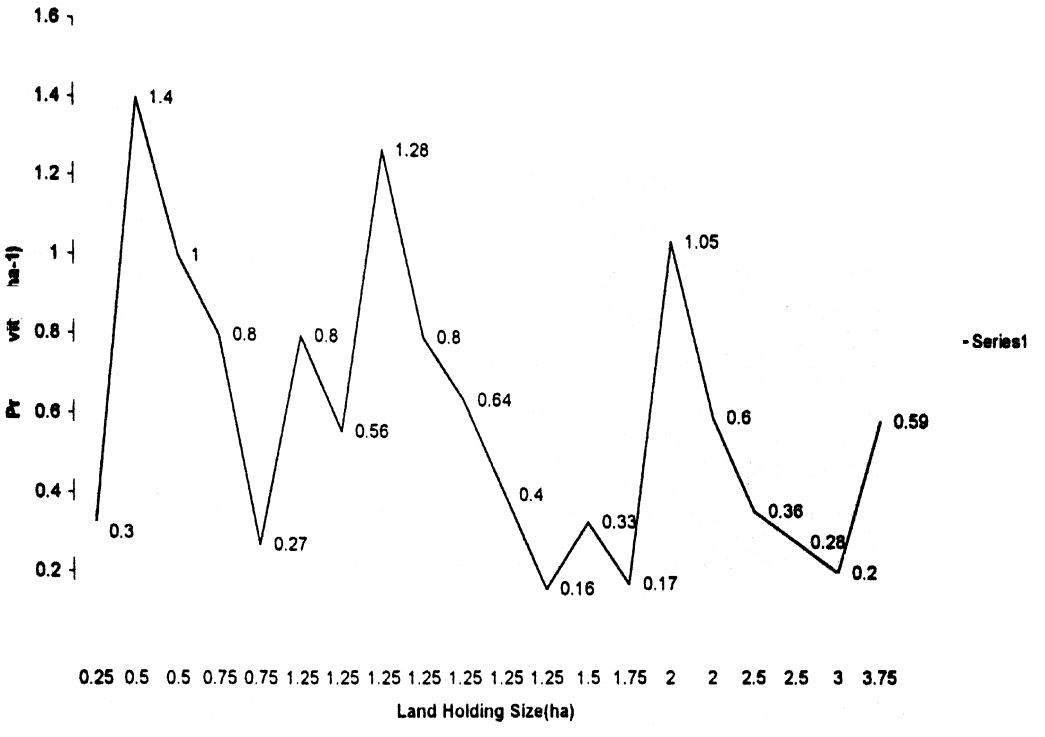


Table 6.8: Land Lord Input - Output in Jaoti

Sl. No.	SC:LL Output Sharing Ratio	Cost (Rs.)	Person days	Output (Qtls)	Gross Output (Rs.)	Net Profit (Rs.)	Profit Per Hectare (Rs.)
1	33:66	3495	0	6.66	4998	1503	1202
2	50:50	2128.5	0	3.50	2450	322	257
3	50:50	5169	0	11.00	8800	3631	968
4	50:50	4493	0	4.50	3600	-893	-357
5	33:66	1235	0	4.66	3732	2497	4994
6	33:66	3551	0	10.66	8530	4979	3983
7	33:66	2242	0	4.00	2999	756	1008
8	33:66	4242	0	4.00	2999	-1243	-414
9	33:66	1555	0	3.33	2332	777	1555
10	33:66	402	0	0.50	475	73	292
11	33:66	3964	0	13.99	11196	7232	3616
12	33:66	2529	0	6.66	4998	2469	1975
13	33:66	2001	0	1.33	933	-1068	-1423
14	50:50	1894	0	6.00	5880	3986	1993
15	33:66	2229	0	3.33	2666	436	291
16	33:66	2587	0	5.33	3998	1411	1129
17	33:66	1941	0	3.33	1999	58	46
18	33:66	2810	0	4.66	3265	456	182
19	33:66	2034	0	1.33	800	-1234	-987
20	33:66	2128	0	2.00	1399	-729	-417

The average profit per hectare leased out is Rs. 833. The Benefit cost ratio is 1.48. Five Landlords incurred a total loss of Rs.5167 ranging from Rs.893 to Rs. 1243, four of them had contracted under the 33:66 ratio and one under the 50:50 ratio.

Table 6.9 : Share Cropper - Output Share -Jaoti

Sl. No.	SC:LL* Output Sharing Ratio	Cost (Rs.)	Person days Own	Person days Hired	Ouput (Quintals)	Gross Output (Qtls)	Net Profit (Rs.)	Profit Ha^{-1} (Rs.)	Total S.C. Person days (Rs.)
1	33:66	1750	18	51	3.34	2502	752	602	69
2	50:50	2128	0	33	3.50	2450	322	257	33
3	50:50	5169	42	0	11.00	8800	3631	968	42
4	50:50	4493	0	20	4.50	3600	-893	-357	20
5	33:66	618	14	9	2.34	1868	1250	2500	23
6	33:66	1778	14	13	5.34	4270	2492	1994	27
7	33:66	1123	13	24	2.00	1501	379	505	37
8	33:66	2123	2	40	2.00	1501	-622	-207	42
9	33:66	778	4	20	1.67	1168	389	779	24
10	33:66	201	15	0	0.25	238	37	146	15
11	33:66	1985	0	52	7.01	5604	3620	1810	52
12	33:66	1266	15	35	3.34	2502	1236	989	50
13	33:66	1001	18	0	0.67	467	-534	-713	18
14	50:50	1894	75	28	6.00	5880	3986	1993	103
15	33:66	1116	0	0	1.67	1334	219	146	0
16	33:66	1295	20	0	2.67	2002	707	565	20
17	33:66	972	20	0	1.67	1001	29	23	20
18	33:66	1406	14	16	2.34	1635	228	91	30
19	33:66	1018	57	0	0.67	400	-618	-494	57
20	33:66	1066	48	0	1.00	701	-365	-209	48
			389	341					

*SC refers to share croppers and LL refers to Landlord

The average profit per hectare leased-in is Rs.133. The Benefit cost ratio is 1.48. Five Share Croppers incurred losses ranging from Rs.365 to Rs.1145 totalling to a loss of Rs. 3032, four of the share croppers had contracted under the 33:66 ratio and one under the 50:50 contract.

Table 6.10: Input Intensity of Low Productivity Farmers-Jaoti (less than average yield)

Sl.* No.	Yield (t ha^{-1})	Seeds ha^{-1} (Kgs)	DAP ha^{-1} (Kgs)	Weeding	PDs ha^{-1}	Profit ha^{-1} Landlord (Rs.)	Profit ha^{-1} Share cropper (Rs.)	Crop Sharing Ratio
19	0.16	100	80	Yes	49	-987	-57	33:66
20	0.17	86	49	Yes	27	-417	-48	33:66
8	0.20	90	33	Yes	17	-414	-42	33:66
4	0.36	100	40	No	8	-357	-357	50:50
17	0.40	120	96	No	19	46	-20	33:66

*Serial No. Refers to the serial numbers of farmers as used in the previous tables.

Average Person days for Jaoti Share Croppers = 26.19.

Average Fertiliser useage per hectare = 36.55 Kg..

The input intensity of DAP is higher than the average for four of the above farmers, however the labour contribution is lesser than the average for three farmers. However the more important factor that has a bearing on the productivity (specifically during the 1999 rainy season) is the slope and drainage facility of the land, which determines the run off, and potential of the land to escape from waterlogging.

Table 6.11 Input Intensity of 5 High Productivity Farmers-Jaoti
(more than average yield)

Sl.* No.	Yield (t ha^{-1})	Seeds ha^{-1} (Kgs)	DAP ha^{-1} (Kgs)	Weeding	PDs ha^{-1}	Profit ha^{-1} Landlord (Rs.)	Profit ha^{-1} Share cropper (Rs.)	Crop Sharing Ratio
11	1.05	83	41	Yes	29	3616	1810	33:66
1	0.80	80	64	Yes	55	1202	602	33:66
7	0.80	87	116	Yes	49	1008	505	33:66
12	0.80	88	70	Yes	45	1975	989	33:66
16	0.64	120	96	No	19	1129	565	33:66

Average Person days for Jaoti Share Croppers = 26.19 PDs

Average Fertiliser use per hectare = 36.55 Kg ha^{-1}

The input intensity of DAP is higher than the average for all the above farmers, in the case of labour except one farmer, the intensity is above the average

Table 6.12 Loss making Share Croppers in Comparison to the Landlords - Jaoti

Sr. No.*	Share Cropper Loss (Rs.)	Landlord Profit/ Loss (Rs.)	Gross Output Landlord (Tonnes)	Gross Output Share Cropper	Share Cropper Person days	Landlord Man Days	Share Contract
4	-893	-893	4.50	4.50	20	0	50:50
8	-622	-1243	4.00	2.00	42	0	33:66
13	-534	-1068	1.33	0.67	18	0	33:66
19	-618	-1234	1.33	0.67	57	0	33:66
20	-365	-729	2.00	1.00	48	0	33:66

*serial number refers to the share croppers and landords as used in the previous tables.

The productivity of six farms which did not do weeding operations are 0.59, 0.36, 0.20, 0.33, 0.64, 0.40 t ha^{-1} with four of the farmers having a yield less than the average yield of 0.54 t ha^{-1}. All the share cropper operated farms are in unirrigated land except three farms which account for3.5 hectares. This is a significant factor in the lower productivity attained among the Jaoti share Croppers, 0.54 T^{ha-1} in comparison to Owner operated farms where majority of the land is Irrigable the Yield is 0.78 t ha^{-1}.

6.2 KHERKHEDI SHARE CROPPERS

Table 6.13: Land Leased(ha) by Share Croppers

Sr. No.	Share Cropper's Name	Dry Land (ha)	Irrigable Land (ha)	Total (ha)	Sown in Rainy season (ha)
1.	Mahesh	2	0	2	2
2	Lekhraj	0	1	1	1
3	Rajaram	0	0.5	0.5	0.5
4	Parmal	0	0.12	0.12	0.12
5	Pahelwan	0.87	0	0.87	0.87
6	Pyarelal	0	0.87	0.87	0.87
7	K.Lal	0	2.5	2.5	2.5
8	N.Singh	0	1.25	1.25	1.25
9	Ashok	1.25	0	1.25	1.25
10	C. Lal	0	1	1	1
11	B. Lal	0	1	1	1
12	D. Singh	0	1.25	1.25	2
13	M. singh		1.25		1.25
	Total	5.25	10.99	16.24	15.81
	Average	0.40	0.84	1.24	1.21

Among the 13 sample farmers 16.24 hectares were leased-in of which 15.81 hectares was cultivated.

Table 6.14: Kherkhedi Share Croppers - Own Land

Serial No.	Share Cropper's Name	Own Dry Land (ha)	Own Irrigable Land (ha)
1	Mahesh	0	0
2	Lekhraj	0	0
3	Rajaram	1	0
4	Parmal	1.75	0
5	Pahelwan	0	0
6	Pyarelal	1	1
7	K.Lal	1.5	1
8	N.Singh	0	0
9	Ashok	0	0
10	C. Lal	0	0
11	B. Lal	2.75	0
12	D. Singh	0.50	0
13	M. singh	0	0
	Total	7.5	2.0

*In Serial No.6 and 7 the Irrigable land is government land being illegaly cultivated.

Table 6.15: Credit and Labour Transactions with the Landlord-Kherkhedi

Share Cropper's Name	Amount Borrowed (Rs.)	Interest Rate (%)	Wheat Borrowed (Kg.)	Wheat Returned (Kg.)	Amount Loaned-to Landlord Without Interest (Rs.)	Works in the Landlord's Own Land
Mahesh	3000	36	300	350	0	Yes
Lekhraj	0	0	0	0	0	No
Rajaram	0	0	0	0	0	No
Parmal	0	0	0	0	0	No
Pahelwan	0	0	0	0	0	No
Pyarelal	1000	36	50	62.5	0	Yes
K.Lal	0	0	0	0	0	No
N.Singh	0	0	0	0	0	No
Ashok	6000	36	300	375	0	No
C. Lal	0	0	0	0	0	No
B. Lal	1000	0	100	125	0	Yes
D. Singh	0	0	0	0	0	No
M. singh	0	0	0	0	0	No

Four among the 13 share croppers incurred cash and wheat loans while 3 share croppers worked as labourers in the owner operated farms.

Table 6.16 : Monetised Inputs(quantity) of owner operated Farms-Kherkhedi

Sl. No.	Seeds Qty. (Kg..)	Sowing Hired Tractor (Hours)	DAP (Kg.)	FYM (Kg.)	Weeding (Hired Person days)	Harvesting (Hired Person days)	Seeds Kg. ha^{-1}	DAP Kg. ha^{-1}
1	200	0	100	0	0	0	100	50
2	100	0	100	0	0	0	100	100
3	50	0	50	900	0	0	100	100
4	10	0	0	0	0	0	83	0
5	175	9	0	0	20	7	201	0
6	250	5	150	0	0	0	287	172
7	250	0	150	0	0	40	100	60
8	100	0	50	0	0	40	80	40
9	100	6	75	0	0	8	80	60
10	100	0	100	0	0	32	100	100
11	100	5	50	0	0	0	100	50
12	200	0	75	0	16	12	100	50
13	150	0	100	0	0	0	120	40

Correlation Between Land Size and Fertiliser(DAP) useage: - 0.03

Average Fertiliser Input per Hectare = 63.25 Kg. ha^{-1}

Table 6.17: Monetised(Total) Input Cost of Share Cropper operated Farms – Kherkhedi.

Sl. No.	Seeds Cost (Rs.)	Hired Tractor Cost (Rs.)	DAP Cost (Rs.)	Weeding Cost (Rs.)	Harvest Cost (Rs.)	Thres. Cost (Rs.)	Transport Cost (Rs.)	Total Cost (Rs.)
1	2400	0	1700	0	0	1470	300	5870
2	1200	0	1700	0	0	943	195	4038
3	600	0	850	0	0	225	180	1885
4	120	0	0	0	0	75	60	255
5	2100	1800	0	600	350	210	157	5217
6	3000	1000	2550	0	0	825	660	8035
7	3000	0	2550	0	2000	1800	1350	10700
8	1200	0	850	1200	2000	300	225	5775
9	1200	1200	1275	1800	400	400	300	6575
10	1200	0	1700	900	1600	160	120	5680
11	1200	1000	850	480	1600	700	525	6355
12	2400	0	1700	480	600	375	300	5855
13	1800	300	850	1200	0	400	300	4850

Per Hectare Costs

Average Cost of Cultivation: Rs.4552.24 ha^{-1}

Average Cost of Cultivation for Landlord: Rs.2781.49 ha^{-1}

Average Cost of Cultivation for Share Cropper: Rs.1770.75 ha^{-1}

Table 6.18: Labour Inputs - Own and Hired for Kherkhedi Share Croppers
(Person days)

Sl. No.	Own Bullock (PDs)	Hired Bullock (PDs)	Weeding Own (PDs)	Weed. Hired (PDs)	Harvest Own (PDs)	Harvest Hired (PDs)	Total PDs	L.L. PDs	S.C PDs	PDs per Hectare
1	16	0	60	0	32	0	108	16	92	54
2	8	0	30	0	20	0	58	0	58	58
3	4	0	10	0	6	0	20	0	20	40
4	2	0	4	0	2	0	8	2	6	67
5	0	0	30	20	16	7	73	0	73	84
6	0	0	0	0	75	0	75	0	75	86
7	0	0	0	0	10	40	50	0	50	20
8	10	0	40	0	12	40	102	0	102	82
9	0	0	60	0	12	8	80	0	80	64
10	8	0	30	0	0	32	70	0	70	70
11	0	0	16	0	32	0	48	0	48	48
12	16	0	60	16	16	12	108	16	92	54
13	0	0	40	0	36	0	76	0	76	61
Total							876	34	842	

Average Person Days = 57.52 ha^{-1}

Average L.L Person Days = 2.18 ha^{-1}

Average S.C Person Days = 55.34 ha^{-1}

Table 6.19: Land Lord Input – Output - Kherkhedi

Sl. No.	SC:LL Output Sharing Ratio	Cost (Rs.)	Person days	Ouput (Qtls)	Gross Profit (Rs.)	Net Profit (Rs.)	Profit Per Hectare (Rs.)
1	20:80	4100	16	8	5880	1780	890
2	33:66	2692	0	4.29	3110	419	419
3	33:66	1237	0	3.96	2970	1733	3467
4	20:80	120	2	1.6	1200	1080	9000
5	20:80	3900	0	4.2	3360	-540	-621
6	33:66	5356	0	14.52	10890	5534	6361
7	20:80	5550	0	36	28800	23250	9300
8	33:66	3850	0	4.95	3960	110	88
9	20:80	3675	0	8	6400	2725	2180
10	50:50	2840	0	2	1600	-1240	-1240
11	20:80	5084	0	14	11200	6116	6116
12	20:80	4100	16	8	6000	1900	950
13	20:80	2950	0	8	6400	3450	2760

Correlation between Land Size and Landlord Person Days : -0.13

Land Lord B:C Ratio : 2.01

Average Gross Output for a Hectare leased-out - 0.75 Tonnes
(out of average output of 0.99 Tonnes ha^{-1})

Average Profit Per Hectare Leased-out - Rs. 2930

2 Leased-out farmers suffered losses of Rs. 621 and Rs. 1240 who **had a 20:80 and a 50:50 contract** respectively.

Table 6.20: Share Cropper - Output Share - Kherkhedi

Sl. No.	SC:LL Output Sharing Ratio	Cost (Rs.)	Person days	Output (Quintals)	Gross Profit (Rs.)	Net Profit (Rs.)	Profit Per Hectare (Rs.)
1	20:80	1770	92	2.00	1470	-300	-150
2	33:66	1346	58	2.21	1602	256	256
3	33:66	618	24	2.04	1530	912	1823
4	20:80	135	6	0.40	300	165	1375
5	20:80	1318	46	1.50	840	- 478	-549
6	33:66	2679	83	7.48	5610	2931	3369
7	20:80	5150	10	9.00	7200	2050	820
8	33:66	1925	60	2.55	2040	115	92
9	20:80	2900	72	2.00	1600	-1300	-1040
10	50:50	2840	38	2.00	1600	-1240	-1240
11	20:80	1271	48	4.50	2800	1529	258
12	20:80	1755	76	2.00	1500	-255	-128
13	20:80	1900	76	2.00	1600	-300	-240

Correlation between Land Size and Share Cropper Person days = 0.44

The share cropper Benefit cost ratio was 1.15 (in comparison to 2.01 for landlords) with the average profit per hectare leased in being Rs.258(in comparison to Rs.2930 for landlords). The average gross ouput for an hectare leased out is 0.24 t ha^{-1} (out of an average output of 0.99 t ha^{-1}). Six of the thirteen share croppers incurred losses which ranged from Rs. 300 to Rs.1300 of which 5 share croppers had engaged in the 20:80 crop sharing agreement with one farmer under the 50:50 ratio.

Table 6.21: Loss making Share Croppers in Comparison to the Landlords - Kherkhedi

Sl. No.	Share Cropper Loss (Rs.)	Landlord Profit/ Loss	Gross Output Landlord (Qtls)	Gross Output Share Cropper (Qtls)	Share Cropper Person days	Landlord Person days	Share Contract
1	-150	890	8.00	2.00	92	16	20:80
5	-478	-540	4.20	1.50	73	0	20:80
9	-1300	2725	8.00	2.00	80	0	20:80
10	-1240	-1240	2.00	2.00	70	0	50:50
11	-505	8150	14.00	3.50	48	0	20:80
12	-255	1900	8.00	2.00	92	16	20:80
13	-300	3450	8.00	2.00	76	0	20:80

The above table reveals the inequitable nature of the 20:80 share cropping contract, the loss to the share cropper is greater when there is a reduced output as was the case during 1999 Rainy. While 7 share croppers incurred a loss, only two landlords did. In the case of the more equitable 50:50 contract the loss has been shared equally. The loss calculated is only the monetised costs and does not include the wage labour of the share cropper or the landlord.

Table 6.22: Soybean Yield of Kherkhedi Share Croppers

Land Size	Yield ($t\ ha^{-1}$)
0.12	1.67
0.5	1.2
0.87	0.6
0.87	2.53
1	0.65
1	0.4
1	1.75
1.25	0.6
1.25	0.8
1.25	0.8
2	0.5
2	0.5
2.5	1.8
Average Yield	0.99

Correlation between Land Size and Yield = -0.19

Figure 6.2

Land Size-Yield Relationship of Kherkhedi Share Croppers

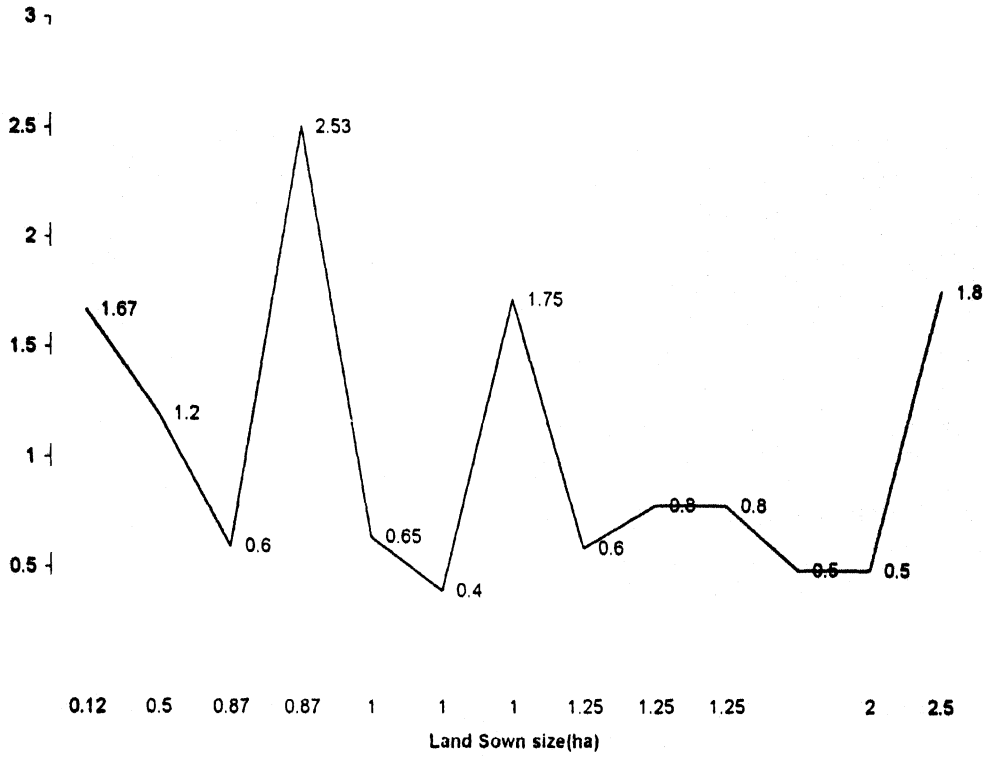


Table 6.23: Highest Productivity of 5 Share Croppers Kherkhedi

Sl.* No.	Yield (t ha^{-1})	Seeds Per Hectare (Kg.)	DAP Per Hectare (Kg.)	Weeding	Person days per Hectare (Rs.)	Profit Per Hectare Landlord (Rs.)	Profit per Hectare Share cropper (Rs.)
6	2.53	287	172	No	86	6361	3369
7	1.80	100	60	No	20	9300	820
11	1.75	100	50	Yes	48	8150	295
4	1.67	83	0	Yes	67	9000	165
3	1.20	100	100	Yes	40	3467	1758

*Serial No. Refers to the serial numbers of farmers as used in the previous tables.

The most productive farmer who achieved the yield of 2.53 t ha^{-1} intensively invested in input of seeds of 287 Kg. per hectare (the recommended input is 100 Kg. Per hectare) and of fertilizers (172 Kg. per hectare). The labour input is the highest among all farmers at 86 person days per hectare.

Table 6.24: Lowest Productivity of Five Share croppers Kherkhedi

Sl.* No.	Yield (T^{ha-1})	Seeds t ha^{-1} (Kgs)	DAP ha^{-1} (Kgs)	Weeding	PDs ha^{-1} (Rs.)	Profit ha^{-1} Landlord (Rs.)	Profit ha^{-1} Share cropper (Rs.)
10	0.40	100	100	No	70	-1340	-1340
12	0.50	100	50	Yes	54	658	165
5	0.60	201	0	Yes	84	-1901	818
8	0.60	50	80	Yes	82	-86	-34
2	0.65	100	100	Yes	58	556	281

*Serial No. Refers to the serial numbers of farmers as used in the previous tables.

The productivity of two farms, which did not do weeding operations, are 2.53, 1.80 t ha^{-1} which is higher than the average yield of 0.99 t ha^{-1} . 10.99 hectare of the total sown land of 15.81 hectare was on Irrigable land. The average yield of owner operated farms in lesser at 0.71 t ha^{-1} in comparison to 0.99 t ha^{-1}, a directly attributable factor in the average Person days per hectare which is 40 in case of owner operated farms in comparison to tenant farms where it is 53.25. The input of DAP per hectare is 63.25 Kg. in share cropped farms in comparison to 45.90 in owner operated farms.

6.3 KUNDHANKHEDI SHARE CROPPERS

Table 6.25: Land Leased in by Share Croppers- Kundhankhedi

Sl. No.	Share Cropper's Name	Dry Land (ha)	Irrigable Land (ha)	Total (ha)	Sown in Rainy (ha)	Own Dry Land (ha)	Own Irri. (ha)
1	Viren Singh	0	1.25	1.25	1.25	0	0
2	Ajit Singh	0	3.75	3.75	3.75	0	0
3	Papu	0	0.75	0.75	0.75	0	0
4	Ram Prasad	0	3.75	3.75	3.75	0	1.00
	Total		9.50	9.50	9.50		

Table 6.26: Credit and Labour Transactions with Landlord- Kundhankhedi

Share Cropper's Name	Amount Borrowed (Rs.)	Interest Rate (%)	Wheat Borrowed (Kg.)	Wheat Returned (Kg.)	Amount Loaned-to Landlord without Interest	Works in the Landlord's Own Land
Viren Singh	0	0	0	0	0	No
Azeez Khan	0	0	0	0	3000	No
Papu	0	0	0	0	2000	No
Ram Prasad	0	0	0	0	10000	No

Table 6.27: Monetised Inputs (Total Quantity) of Share Croppers- Kundhankhedi

Sl. No.	Seeds (Kg.)	Sowing Hired Person days	Sowing Hired Tractor Hours	DAP (Kgs)	Weeding Hired Man Days	Harvesting Hired Man Days
1	125	0	2.5	70	0	40
2	100	6	0	150	0	60
3	300	0	5	150	26	50
4	250	0	7	150	40	0
Total						

Correlation between Land Size and Fertiliser(DAP) useage = 0.46

Average Input Per Hectare = 54.73 Kg. Per Hectare.

Table 6.28: Monetised Input Cost of Share Cropper Operated Farms

Sl. No.	Seeds Cost (Rs.)	Hired Tractor Cost (Rs.)	DAP Cost (Rs.)	Weeding Cost (Rs.)	Harvest. Cost (Rs.)	Thres Cost (Rs.)	Transport Cost (Rs.)	Total Cost (Rs.)
1	1500	500	1190	0	1200	255	180	4825
2	3600	0	2550	0	1800	1040	780	9770
3	2400	1000	2550	780	1500	563	450	9243
4	3600	1400	2550	1200	3000	638	510	12898

*Threshing Ratio: 100:5

Average Cost of Cultivation: Rs.3867 ha^{-1}

Average Cost of Cultivation for Landlord: Rs. 1933.5 ha^{-1}

Average Cost of Cultivation for Share Cropper: Rs. 1933.5 ha^{-1}

Table 6.29: Labour Input - Own and Hired for Kundankhedi Share Croppers

Sl. No.	Own Bullock	Weed. Own	Weed. Hired	Harvest Own	Harvest Hired	Total PDs	S.C. Own Labour	S.C PDs	Person days ha^{-1}
1	0	10	0	5	40	55	15	55	44
2	6	0	0	4	60	64	10	64	17
3	0	0	26	0	50	76	0	76	101
4	0	0	40	32	0	72	32	72	19.2

Average PDs = 28.10t ha^{-1}

Correlation between Land Size and Landlord Person days: 0.00

Correlation between Land Size and Share Cropper Person days: 0.03
(Share Cropper PDs = Total PDs).

Table 6.30: Landlord Output share Kundhankhedi

Sl. No.	SC:LL Output Sharing Ratio	Cost (Rs.)	Person days	Ouput (Qtls)	Gross Output (Rs.)	Net Profit (Rs.)	Profit Per Hectare (Rs.)
1	50:50	2412.5	0	3	2550	137.5	110
2	50:50	4885	0	13	10400	5515	1471
3	50:50	4621.5	0	7.5	5625	1003.5	1338
4	50:50	6449	0	8.5	6375	-74	-20

Average profit = Rs.693 ha^{-1}

Benefit Cost Ratio = 1.35

Landlord PDs : 0.00 ha^{-1}

Correlation between Land Size and Landlord Person days : 0.00

Table 6.31 Soybean Yield of Kundhankhedi Share Croppers

Sl. No.	Land Size(Ha)	Yield (t ha^{-1})
1	1.25	0.48
2	3.75	0.69
3	0.75	2.00
4	3.75	0.45
Average Yield		0.91

Correlation between Land size and yield = -0.62

Diagram 6.3

Relationship between Land Size and Productivity among Kundhankhedi Share Croppers

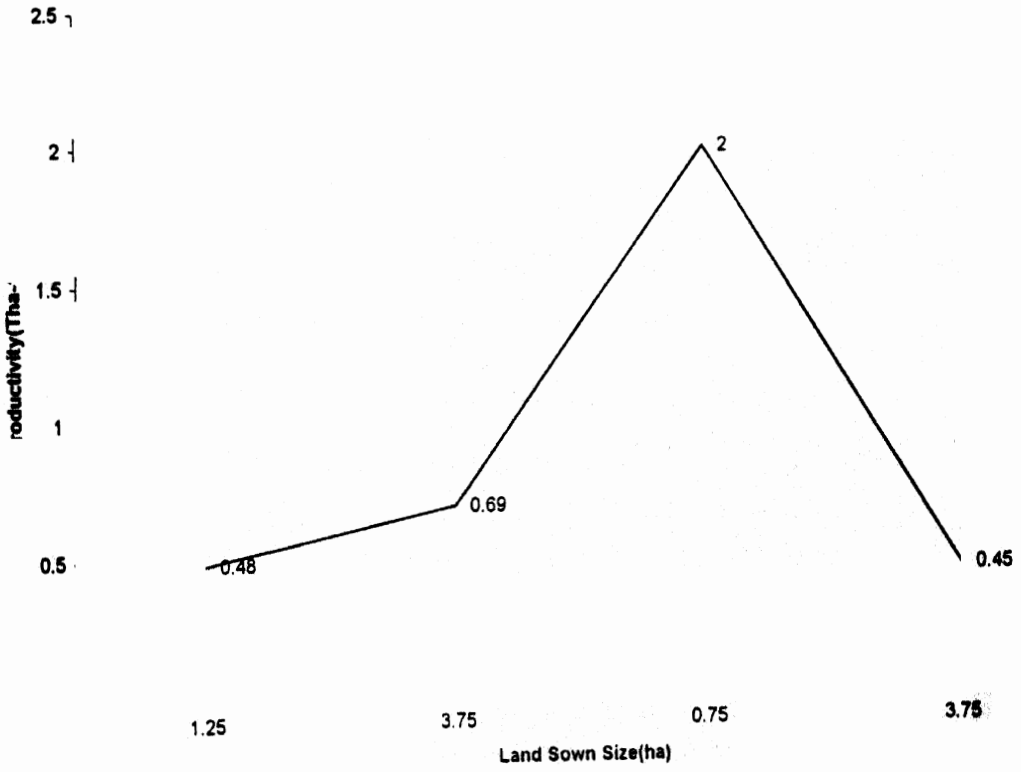


Table 6.32: Share Cropper - Output Share- Kundhankhedi

Sl. No.	SC:LL Output Sharing Ratio	Cost (Rs.)	PDs Own	PDs Hired	Output (Qtls)	Gross Output (Rs.)	Net Profit (Rs.)	Profit ha^{-1} (Rs.)	Total S.C. PDs
1	50:50	2412.5	10	80	3	2550	137.5	110	69
2	50:50	4885	14	120	13	10400	5515	1471	33
3	50:50	4621.5	0	76	7.5	5625	1003.5	1338	42
4	50:50	6449	32	40	8.5	6375	-74	-20	20

Share Cropper B:C Ratio: 1.35

Average Profit = Rs.693 ha^{-1}

Table 6.33: Input Intensity of Kherkhedi Share Croppers

Sl. No.	Yield (t ha^{-1})	Seeds ha^{-1} (Kg.)	DAP ha^{-1} (Kg.)	Weeding	PDs ha^{-1}	Profit ha^{-1} Landlord (Rs.)	Profit ha^{-1} Share cropper (Rs.)
4	0.45	100	56	Yes	100	496	496
1	0.48	80	40	No	51	2423	2423
4	0.69	267	200	Yes	101	-716	-716
3	2.00	80	40	Yes	51	1241	1241

6.4 Share Croppers- Summarised Results and Analysis

Table 6.34: Land Holding - Share Cropper Operated Farms

SL. No.	Village	Dry	Irrigable	Total	Sown 1999	Sample Size
1	Jaoti	30.25	3.5	33.75	30.5	20
2	Kherkhedi	5.25	10.99	16.24	16.24	13
3	Kundhankhedi	0.00	9.5	9.5	9.5	4
	Total	35.5	23.99	59.49	56.24	39

Table 6.35: Correlations between Land Size and Variables (Share Croppers)

Sl. No.	Village	Fertiliser use	Land Lord PDs	Share Cropper PDs
1	Jaoti	-0.45	-0.16	-0.57
2	Kherkhedi	-0.03	-0.13	0.44
3	Kundhankhedi	0.46	0.00	0.42
	Average	-0.32	-0.37	-0.51

Table 6.36: Average of Variables- (Land Lord)

Sl. No.	Village	Cost of Cultivation (Rs.)	Land Lord Cost (Rs.)	PDs ha^{-1} (Rs.)	B-C Ratio	Yield (t ha^{-1})	Gross Output Share (t ha^{-1})	Profit (Rs.)
1	Jaoti	2813	1726	2.0	1.28	0.54	0.36	833
2	Kherkhedi	4452.24	2781.49	2.18	2.01	0.99	0.74	2930
3	Kundhan.	3867	1933.5	0.0	1.35	0.66	0.33	693

Table 6.37: Average of Variables- (Land Lord)-continued

Sl. No.	Village	Loss Making Landlords	Loss Amount (Rs.)
1	Jaoti	5	5167
2	Kherkhedi	2	1780
3	Kundhankhedi	1	74
	Total	8	7021

Table 6.38: Average of Variables- Tenancy (Share Cropper)

Sl. No	Village	Average Cost of Cultivation (Rs.)	Share Cropper Cost (Rs.)	Person days Per Hectare	B-C Ratio	Yield ($t\ ha^{-1}$)	Gross Output ha^{-1}	Profit (Rs.)
1	Jaoti	2813	1087	24	1.35	0.54	0.18	133
2	Kherkhedi	4552.24	1771.49	20	1.59	0.99	0.24	258
3	Kundhankhedi	3867	1933.5	34	2.24	0.66	0.33	693

Table 6.39: Average of Variables- Tenancy (Share Cropper)-continued

Sl. No.	Village	Loss making Share Croppers	Loss Amount (Rs.)
1	Jaoti	5	3032
2	Kherkhedi	6	3873
3	Kundhankhedi	1	74
	Total	12	6979

Table 6.40: Loss Incurred by Landlords and Share Croppers under different contractual arrangements

Contractual Arrangement	Landlord(Nos)	Share Croppers(Nos)
20:80	1	5
33-66	5	4
50-50	2	3
Total	8	12

Productivity

The average soybean productivity is 0.68 t ha^{-1} marginally lesser than owner operated farms (0.72). The average productivity in the three villages of Jaoti, Kherkhedi and Kundhankhedi are 0.54, 0.99 and 0.66 t ha^{-1}. The variations and the differential input intensities between the highest productive and lowest productive in the Jaoti and Kherkhedi are as follows.

The highest productivity of 1.05 t ha^{-1} in Jaoti involved an input of 41 Kg. of DAP per hectare compared to an average of 36.5 Kg. for the village and the labour input of 29 person days ha^{-1}. The lowest productivity of 0.16 t ha^{-1} involved a higher input intensity of 80 Kg. of DAP t ha^{-1} and labour input of 49 person days t ha^{-1}. Therefore the significant variable determining the soybean productivity, is the water logging potentiality of the land, although input practices do play a important role as the evidence of higher productivity among ICRISAT trial farmers.

In Kherkhedi share croppers, the highest productivity of 2.53 t ha^{-1} is the highest yield both among owner operated farms and share cropped farms. The input intensity on the 0.87 hectares land per hectare was

Seeds	:	287 Kg. (the recommended input is 100 Kg.)
DAP	:	172 Kg.
Weeding	:	Not done
Person days	:	86 (highest among the share croppers, the average is 56.16 person days).

The lowest yield of 0.40 t ha^{-1} in 1.00 hectare has an input of seeds at the rate of 100 Kgs of seeds ha^{-1} of 50 Kg. of DAP ha^{-1}, no weeding and person days of 70 days t ha^{-1}.

Profitability

The average profit for the Landlords is Rs. 494, 2672 and 693 compared to Share croppers at Rs. 376, 131 and 693 for Jaoti, Kherkhedi and Kundhankhedi respectively. The profitability in all the cases of the landlord is higher. This is despite the non-inclusion of the non-monetised input costs of the share cropper(cost of the labour by the sharecropper and his family interest on the production loans incurred by the share cropper), which demonstrates the exploitative nature of the share cropping contracts. 8 Landlords incurred a loss of Rs.7021 compared to 12 share croppers who incurred a loss of 6979. Under the 20:80 contract while 5 share croppers incurred a loss, only one landlord had a loss reflecting the inequitable nature of the contract. In the 33:66 contract, 5 landlords and 4 share croppers incurred a loss. Under the 50:50 contract, 2 landlords and 3 share croppers incurred a loss.

Land Size-Productivity Relationship

The relationship is found to be inverse with a correlation of –0.30. The correlation for Jaoti, Kherkhedi and Kundhankhedi(sample size-4) are -0.30 and -0.19 -0.62.

Fertilisers-Land Size Relationship

The relationship is inversely related with a correlation of -0.32. The correlation for Jaoti and Kherkhedi are -0.45 and -0.03 respectively whereas for Kundhankhedi it is positively correlated at 0.46 (sample size-4).

Labour-Land Size-Yield Relationship

The relationship between land lord person days and land size is inverse with a correlation of -0.37, the relationship is inverse for Share cropper may days also at a correlation of -0.51.

In Jaoti, two share croppers hired out both weeding and harvesting operations (Sl.No.1 and 2), while two farmers hired out harvesting operations and one farmer hired out weeding operations., 11 of the 20 share croppers have hired-in-labour during the peak harvest seasons as the work has to be accomplished in a short period of time. The farmers who did not do weeding, Sl no. 2, 4, 8, 15, 16 and 17 had an yield of 0.56, 0.36, 0.20, 0.33, 0.64 and 0.40 t ha^{-1} with four of the size farmers having a yield lesser than the average of 0.54 t ha^{-1}. In Kherkhedi, only one farmer hired out the harvesting operations (Sl.No. 10) and two did not weeding operations (Sl. No. 6 and 7) had an yield of 2.53 and 1.80 t ha^{-1} which contrastingly is the highest yield among all the share croppers. In Kundhankhedi, one farmer who did not do weeding (Sl. No. 2) had an yield of 0.69 t ha^{-1} lower than the average yield of 0.91 t ha^{-1}, one farmer hired out the harvesting operations (Sl.no. 3).

Rudra (1976) analysing as to why small farmers hire-in labour puts forth three plausible explanations - (i) Caste plays an important role and the manual work is not done by certain castes (ii) No availability of adult members and (iii) Need for more labour to complete the work in a certain period of time, especially in harvesting (iv) Labour locking (share cropper has to work in the landlord's own land, especially during the peak periods) with the landlord with whom a credit loan for consumption or production has been taken.

Interlocking Transactions

The cash and kind loans (wheat) are incurred by the tenant at the sowing period in July and the landlord pays back the tenant's share after deducting the principal in after the threshing operations is completed in November. The interest charged is 36% on cash loans. In Jaoti village, 10 of the 20 share croppers borrowed cash of which four off them also borrowed wheat. One share cropper lent Rs. 1500 to

the landlord for which no interest is charged (50:50 contract). Two share croppers only borrowed wheat. Three share croppers report working on the landlord's own operated land of which two worked without getting wages. In Kherkhedi, four of the 13 share croppers reported borrowing both cash and wheat from the landlords and three of them report working on the landlords own land. In Kunkhankhedi where all the four share croppers have engaged in the 50:50 contract, three of them loaned Rs. 3000, Rs. 2000 and Rs. 10,000 to the landlord without interest. Among the share croppers, the labour locking with landlord has been found weak, two share croppers in the case of Jaoti, three in the case of Kherkhedi and none in the case of Kundhankedi although borrowing for production and consumption loans is relatively stronger.

6.4 COMPARISON OF OWNER OPERATED FARMS WITH SHARE CROPPED FARMS

Jaoti Village

The total land sown by the 18 owner operated farms in Jaoti village was 31.22 hectares of which 30.62 hectare was Irrigable land whereas the 20 sharecroppers cultivated 30.5 hectares of land of which only 3.5 hectares. The input intensity as expected is higher in the Irrigable land (owner operated) farms. The correlation between land size and DAP application is positive but not significant in owner operated farms (0.22) whereas it is negative in the case of share croppers (-0.45). The average labour input is 27.61 person Days ha^{-1} in owner operated farms in comparison to a marginal lesser 26.19 person days in share cropped farms. The cost of cultivation per hectare is Rs. 3100 in owner operated farms in comparison to tenant operated farms it was lesser at Rs.2813. The average profit in owner operated farms is Rs. 2636 compared to Rs.966 in share cropped farms. The differential in soybean yield is substantial, 0.78 t ha^{-1} in owner operated farms in comparison to 0.54 t ha^{-1} in share cropper operated farms . The correlation between land size and yield is negative at -0.27 and -0.30 respectively.

Kherkhedi

The total sown area of the 12 owner operated farms is 21.24 hectares which is entirely irrigable, in comparison among the 13 share croppers 10.99 of the 15.81 hectares is Irrigable. The correlation between land size and DAP is positive (0.08) in the case of owner farms but not significant compared to a negative correlation among the share croppers (-0.03). The cost of cultivation per hectare in owner operated farms is Rs. 4035 compared to Rs.4452.24 in share cropped farms, the investment of labour is also lower at 40 days per hectare in owner operated farms in comparison to 57.52 days among share croppers. The profit is Rs.2444 ha^{-1} and Rs.3188 ha^{-1} respectively. The higher profit in share cropped farms is due to the higher yield, 0.99 t ha^{-1} compared to 0.71 t ha^{-1} among the share croppers. The correlation between land size and yield is negative at -0.38 in owner operated farms in comparison to -0.19 in share cropped farms.

Kundhankhedi Village

The total sown area of the 9 owner operated farms is 20 hectares which is Irrigable in comparison to 4 share croppers who leased-in 9.5 hectares of Irrigable land. The correlation between land size and DAP is positive in the case of owner operated farms ($R^2 = 0.30$), and share croppers($R^2 = 0.46$) but not significant. The investment of labour is 35.45 ha^{-1} in case of owner operated farms in comparison to lower input of 28.10 ha^{-1} among share croppers. The cost of cultivation among owner operated farms is Rs.3285 ha^{-1} in comparison to Rs.3867 ha^{-1} in share cropper operated farms, The yield is higher among the share croppers at 0.91 T^{ha-1} compared to 0.66 T^{ha-1} . It is however important to realise that the sample is 4 share croppers compared to 9 owner operated farms and the results have to be interpreted with caution as the sample size is smaller (The total sample of the village constitutes the total population of the village).

Table 6.41 Comparison between Owner Operated and Share Cropped Farms

	Average Cost of Cultivation (Rs.)	Average Benefit Cost Ratio	Average Profit ha^{-1} (Rs.)	Average Yield ha^{-1} (t ha^{-1})	Average Person Days (t ha^{-1})	Average DAP (Kg ha^{-1})
Owner Operated Farms	3320	1.63	2045	0.72	21.22	19.81
Share Cropper Operated Farms	3443	1.54	1773	0.68	31.78	46.76

The above table provides evidence to show that the input intensities of tenant operated farms need not be lesser than owner operated farms as usually documented in the literature. On the contrary significant differentials have been found. In the case of person days per hectare, it is 31.78 compared to 21.22 in owner operated farms. The differential in fertiliser input is significant with the input being more than double in share cropper operated farms. The cost of cultivation of share cropper operated farms is marginally higher than owner operated farms , whereas the profit per hectare is higher by Rs.272 in owner operated farms. The differentials in the average land size are not too significant. The average land sown is 1.73, 1.77 and 2.22 among owner operated farms in Jaoti, Kherkhedi and Kundhankhedi respectively compared to 1.52, 1.21 and 2.37 among share cropper operated farms

The reason for the higher input intensity in share cropped farms could be due to the incentive structures of the contractual arrangement. Thirty of the share croppers engaged either in a 33 :66 or 50:50 contract, the input cost of seeds and fertilizers are borne upfront by the landlord for which the tenant has to pay an interest (either 33% or 50% of the costs). It is therefore rational for the landlord to invest more inputs, if the output is higher, particularly in the 33:66 contract, greater returns would accrue to him. If the returns are poorer as was the case in the 1999 rainy season, the tenant has to pay the interest on the production inputs (seeds and fertilisers) and since the input

intensity is higher, particularly of fertiliser, the landlord gains through greater interest earnings. The above argument is supported from the following evidence of the landlords under the 20:80 contract. The input cost (of seeds and fertilisers) is borne by the landlord and the data from Kherkhedi village reveals that the average investment of fertilisers is less when the landlord fully bears the cost- the input of landlords under the 20:80 contract was – 0 (4), 0(5), 60(7), 60(9), 50(11), 50(11) Kg ha^{-1} , and in all the cases the input is lesser than the average for the Kherkhedi share croppers at 63.25 Kg ha^{-1}.(The number in the brackets refers to the serial number of the share cropper in Kherkhedi).

The contracts entered into are not sacrosanct and due to the unequal bargaining power, a reduced output would be interpreted by the landlord has lack of effort by the share cropper and reduced share would be given to him.

The profit rate of owner operated farmers being higher than the landlords who leased-out land gives support for the argument made by the share croppers that poorer quality land is leased out. The evidence in terms of profitability suggest that if the land was of better quality, the landlord would prefer to cultivate it on his own. However one also needs to consider that the profitability for the landlord is not just restricted to the monetised returns on the crop output, extra income is earned from the interest charged to the share cropper. The maximization of his leisure especially under the 33:66 and 50:50 contracts wherein all the operations are leased-out adds to the profitability of the contract. The argument proposed by Bhaduri (1973) of the landlords exploiting the tenants through usury and they being more interested in higher income through the money lending than higher outputs which would reduce the dependence on the landlords still remains relevant.

The ICRISAT trial farmers have been able to achieve a 52. 8% higher yield, 1.1 t ha^{-1} , compared to an average yield 0.72 t ha^{-1} in the three study villages, but have not been able to escape the water logging problem and the land size-yield relationship is also found inverse (-0.39). The inverse relationship between land size and productivity remains both among the owner operated and the share cropped farms and the evidence presented here is additional evidence to prove the endemic nature of this relationship in Indian agriculture.

The additional benefits for the landlord is that the supervision costs are lesser under a share cropping contracts as the incentive for the share cropper to work harder is greater. This is due to the inequitable nature of the contracts, which requires a higher output to be realised for the realisation of sufficient returns, which would enable him to atleast, earn the wage labour costs for him and his family. The penalty clause is another equally determining factor for a greater effort.

Table 6.42 : Composition of Dry land and Irrigable land among the Owner Operated and share Cropped Farms

Number of the Village	Share Cropped		Owner Operated	
	Dry (Ha)	Irrigable (Ha)	Dry (Ha)	Irrigable (Ha)
Jaoti	27.00	3.50	0.00	31.22
Kherkhedi	13.69	2.12	1.5	19.74
Kundhankhedi	0.00	9.50	2.5	17.50
Total	40.69	15.12	4.0	68.46

Table 6.43: Comparative Yield of Owner Operated Farms vis-a-vis Share Croppers

Name of the Village	Owner Operated Farms Average Yield (T^{ha-1})	Share Cropped Farms Average Yield (T^{ha-1})
Jaoti	0.78	0.54
Kherkhedi	0.71	0.99
Kundhankhedi	0.66	0.91
Average	0.72	0.68

The differential in productivity between the owner operated farms and share cropped farms is not substantial, 0.72 t ha^{-1} in comparison to 0.68 t ha^{-1}. The proportion of dry land among the share cropped farms is 72.90%, while among owner operated farms dry land is only 5.85 it is only considering this the yield differentials are quite minimal. Although in the 1999 rainy season, the problem was of excess rainfall, the quality of the land is better in Irrigated land. In most of the dry land, the post-rainy season crop, wheat is cultivated and in the rainy season it is left uncultivated. The high input intensity in terms of labour and fertiliser application in the share cropped have been the determinants in achieving a yield close to owner operated farms (with an higher proportion of Irrigable land).

The results of this study provide evidence on the variation in productivity across farms caused due to waterlogging. The variability in the productivity of Soybean strengthens the risk-aversive behaviour of the farmers, more in the case of the dry land farmers, which leads to non-optimum input allocation.The study provides empirical support to the 'monitoring' approach of Cheung (1969), the landlords stipulate and effectively monitor share croppers activities and provides evidence of the resulting unequitable distribution of output , 'credit-locking' of the tenant which strengthens the bargaining power of the landlord in deciding the output share contract.

6.6 IMPLICATIONS OF LOW PRODUCTIVITY UNDER A LIBERALISED TRADE REGIME

The average productivity for India for the year 1999-2000 was 0.94 t ha^{-1} compared to 1.75 t ha^{-1} in China, 2.45 t ha^{-1} in U.S.A, and 3.12 t ha^{-1} in the European Union compare to 0.94 t ha^{-1} in India.

In February, 1995 almost all the edible oils have been put under the Open General License with an import duty of 30%, in July 1998 it was reduced to 15%, however recently on November 21st, 2000 this has been again increased to 35% with demand coming from industry for protection. The lower productivity of soybean, particularly Irrigated soybean has cost implications because of the higher subsidy on it. ICRISAT (1999) estimated that the subsidy per hectare on Irrigated soybean is estimated at Rs. 2091 per hectare compare to Rs. 963 for rainfed soybean. The subsidy component includes the subsidy on fertilisers along with the subsidy on the credit. It is estimated that if all the subsidies were abolished, the profitability of Irrigated Soybean would suffer by 48% and this would induce a shift away from the crop.

The private and social profitability of soybean as estimated by ICRISAT (1999) is as follows:

Table 6.44: Private and Social Profitability of Soybean

	Private Profit (Rs.)	Social Profit (Rs.)	Subsidies per Hectare (Rs.)
Irrigable	4389	-1129	2091
Rainfed	6390	230	903
Average	6150	-109	

Source: Typology Construction and Economic Policy Analysis for Sustainable Rainfed Agriculture, (ICRISAT, 1999, P. 62).

It is therefore argued that

> "since this zone (zone 9, including M.P.) is dominated by a crop that is inefficient in resource use and low in generating social returns, it seems that policies that correct for distortions in domestic prices would have their desired effect, i.e. a shift away from Soybean towards sorghum, maize and pigeonpea to achieve. this must be qualified if soybean possesses specific double-crop advantages relative to other rainy season-crops" (ICRISAT, 1999, P. 68).

It is however important to realise that a pro-active strategy focused on improving the productivity of soybean has a greater scope for welfare enhancement, as the private profitability of the crop is higher compared to the above crops. However this should not be at the cost of efficiency, a gradual reduction in subsidies, particularly of fertilisers is warranted (a large part of the subsidy is a producer subsidy, in effect the inefficiency of the public Sector units and private Sector units are being subsidised, freer imports would results in their procurement at a lesser cost). This calls for not only programmes for improving the management practices for increasing productivity but also wider reforms in the rural factor markets in credit, insurance and in the land markets relating to leasing. Reforms, particularly related to leasing are discussed in the Policy chapter.

CHAPTER 7

SUMMARY, POLICY IMPLICATIONS AND RECOMMENDATIONS TO THE STAKEHOLDERS

7.1 SUMMARY

The yield of the owner-operated farms are marginally higher at 0.78 t ha^{-1} in comparison to share cropper operated farms which have an average yield of 0.68 t ha^{-1}. The yield of owner operated farms in Jaoti and Kundhankhedi villages is higher than share cropped farms whereas in the case of Kherkhedi, the yield of owner operated farms is lesser than share cropped farms (0.71 t ha^{-1} compared to 0.99 t ha^{-1} of share cropped farms). The investment of labour however is lesser in owner operated farms (40 person days ha^{-1} compared to 57.52 person days ha^{-1} days among share croppers). In Kundhankhedi village, yield of both types of farmers are the same at 0.66 t ha^{-1}.

It needs to be emphasized that among the owner operated farms only 4.0 of the total 72.46 hectares sown is unirrigated constituting 5.52% of unirigated land in comparison to share cropper operated farms where 40.69 of the total sown area of 55.81 is unirrigated constituting 72.90% of the land. Although, the problem faced by the farmers in the 1999 rainy season was of excess rain and the consequent water logging, generally dry land is used only for one crop in the post-rainy season and rest of the year it is left fallow. The growing of soybean under rainfed land is considered is not perceived as a good proposition, in favour of an assured post rainy season crop.

The correlation between land size and yield has been found negative in all the cases, except Kundhankhedi owner operated farmers (0.27, sample size - 4., among the share croppers it is -0.02). In Jaoti, among owner operated farmers it is -0.27 compared to -0.30 among share crops whereas in Kherkhedi, it is -0.38 and -0.10 respectively, with the share croppers having a lesser negative correlation due to higher yield.

The cost of cultivation is higher among the owner operated farms in Jaoti (Rs.3100 in comparison to Rs.2813 among share croppers) and Kherkhedi, and Kundhankhedi the cost of cultivation of share croppers is marginally higher (Rs. 4552 compared to Rs. 4035 and Rs. 3867 compared to Rs.3285) respectively. The profit for owner operated farms in comparison to leased-out farms is as follows.

The profit per hectare is higher among owner operated farms in Jaoti [Rs. 2636 compared to Rs. 966 among share croppers (taking the average profit of landlords and share croppers)] and Kundhankhedi (Rs.3285 in comparison to Rs.1386) in Kherkhedi the tenant operated farms have a higher profit (Rs. 3188 compared to Rs. 2444 among owner operated farms) . The profit of the tenants in all cases have been lesser than the landlords, in Jaoti (Rs.133 per hectare compared to Rs.833) and Kherkhedi (Rs.2930 compared to Rs.258) whereas in Kundhankhedi both have an equal profit of Rs. 693 per hectare (50:50 contract). While 8 landlords incurred loss amounting to Rs. 7021, 12 share croppers incurred a loss of Rs.6979. The evidence from the study suggests that, the input intensity has been higher in the case of share cropped farms for both labour (31.78 person days ha^{-1} in share cropped farms compared to 21.22 person days ha^{-1} in owner operated farms) and Fertiliser, (46.76 kgs among share croppers compared to 19.81 kgs among owners). This is due to the nature of the contract, wherein there is strict supervision from the landlord who also gains from interest earnings due to an higher investment (either 50 or 33% costs are borne by the tenant).

The more important variables have been the waterlogging potentiality of land and the quality of land. The lesser profit per hectare lease-in by the share croppers has been primarily due to the unequal nature of the share cropping contract, the yield differentials not being significantly higher. The ICRISAT trial farmers have been able to achieve an higher yield of 1.1 t ha^{-1} in the 1999 season but have not been able to escape the water logging problem and the land size-yield relationship is also found inverse (-0.39).

The inverse relationship between land size and productivity remains both among the owner operated and the share cropped farms and the evidence presented here is additional evidence to prove the endemic nature of this relationship in Indian agriculture. The emergence of the newer forms of share cropping contract (33:66 and

20:80) provides additional evidence on the exploitative nature of the share cropping contracts.

7.2 Policy Implications

The policy suggestions put forth in the literature to reduce the inverse relationship between land size and productivity include, imposition and enforcement of land ceiling, and transfer of ownership right to tenants (Junankar, 1976) accompanied by provision of factor inputs (Cornia, 1985). The recent studies suggest that the evidence in enforcement of land ceiling and in redistributing land has been poor, ceiling laws have, in all except three states, transferred less than 1 % of agricultural area to the target group. Loopholes in the law allowed the bulk of landlords to avoid expropriation by distributing surplus land to relations and dependents (Appu, 1996, Mearns, 1997).

A important area wherein reform has to progress at a faster pace is in rural credit sector, where NABARD has started to play a pro-active role in promoting and strengthening Self Help groups (SHGs). This process has to be strengthened and enhanced to reduce the market imperfections in the credit market and help the farmers, tenants and landless labourers in accessing credit at reasonable rates of interest. This would help in reducing the problem of under investment of inputs in agriculture. The guidelines on this issue have been formulated under the 'Common Principles for Watershed Development" by the Department of Agriculture and Cooperation (MANAGE, 2000, P. 7).

Besley and Burgess's (2000) study using data from sixteen main Indian states from 1958 to 1992 find that

"our main finding is that there is a robust link between land reform and poverty reduction. Closer scrutiny revels that, in an Indian context, this is primarily due to land reforms that change the terms of the land contracts rather than actually redistributing land. Consistent with the anti-poverty impact we find that land reform has raised agricultural wages" (p. 393) and "overall these results suggest that the impact on poverty comes mainly through reforms that affect production relations, rather than by altering the distribution of land" (*ibid*, p. 419). It is argued that the

benefits in land reform therefore have largely been due to reform in the tenancy contractual relations and the rise in agricultural wages.

There have been major design flaws in the legislation as well, in Madhya Pradesh, the ceilings have been legislated at a higher limit, 10.12 hectares (from 1960-1972) and in the band of 4.05 to 21.85 hectares after 1972 according to the Ceilings on Agricultural Holdings Act of 1960. Although, leasing is prohibited under the Land Revenue Code of 1960, (the evidence of its existence is established with additional recent empirical evidence), the effect of the legislation has only made the contractual arrangements more exploitative with the emergence of the 20:80 and 33:66 contract replacing the more common and more equitable 50:50 contract, tenure security has became shorter. The lack of implementation of the land ceilings act has only maintained the inequality in land holding and due to greater demand for leased-in land. Due to low wages and lesser availability of labour in the lean seasons, the labour-locking of the landless and the small and marginal farmers due to the share cropping contract has been maintained and the exploitative 20:80 contract has emerged as a newer form of exploitation of marginal farmers and landless labourers.

Commenting on Madhya Pradesh Besley and Burges (2000) opine that "implementation of reform (is) inefficient, one reason being that the sharecroppers and tenants are not recorded" (p. 399) which is due to the lack of political and administrative will. Therefore in the case of Madhya Pradesh neither has the reforms in land redistribution nor tenancy reforms have been beneficial, due to design flaws and lack of political and administrative will in their implementation.

The recent policy initiatives of the Government of India on land reforms is in contrast to the earlier legislations.The new draft national agricultural policy states that its approach on land reforms will focus on 'development of lease market for increasing the size of holdings and by making legal provision for giving private lands on lease for cultivation and agri-business". It also advocates that, 'private sector' participation will be promoted through contract farming and land leasing arrangements to allow accelerated technology transfer, capital inflow and assured market for crop production, especially oil seeds, cotton and horticultural crops' (cited by Saxena, 2000). To became more productive and competitive in the oil seed sector, particularly in the case of palmolein. Gulati (2000) consider the possibility of freeing

it from the land ceiling act and invite large-scale investment in this sector by the corporate world.

A recent discussion paper of the Planning Commission, Saxena (2000) argues for open leasing in 'developed' agricultural markets which it is argued would help the share croppers to get better rents. It is suggested that the selective open leasing be implemented in a pilot mode in selected districts and calls for the enforcement of the existing rigorously in 'undeveloped markets' even when maintaining that the bureaucracy is corrupt and not interested in enforcement of the laws. As argued rightly by Mearns (1998:36) "... rental markets are an important means by which poor gain access to land. However deregulation of rental markets will benefit the poor only when there is a credible threat of ceilings enforcement and where there is possibility of clearly defined and enforceable contracts".

A radical suggestion is also put forth by Dr. Saxena that 'unless the land hunger of the poor is mobilised into a militant movement to neutralize the property instinct of the rich farmers, long-term security in law to tenants does not seem to be feasible' (P. 4). The way forward is the need for political and administrative will to reform, the design flaws in laws, reform the bureaucracy and take proactive steps in enforcement of land ceilings and initiate tenancy reform measures. The Madhya Pradesh Ceilings on Agricultural land Holdings Act fix the ceiling at 7 hectares for Irrigable land, which is at a higher limit, the enforcement is weak even of this limit. The prohibition of leasing has only made tenancy to go underground and the study has pointed out to the exploitative contracts that have arisen in the rural areas (33:66 and 20:80 crop sharing contracts emerging as the widely followed than the earlier, more equitable 50:50 contracts). If equitable development has to be achieved land and tenancy reforms needs to be given utmost importance by the politicians, policy makers and bureaucrats in Madhya Pradesh. The success achieved by the Rajiv Gandhi Watershed Mission in developing watersheds since 1996 have to be viewed with caution and it is important to understand the equity of the distribution of benefits among the farmers, tenants and the landless labourers.

If the above reforms do not seem to be realistic in the liberalised pro-market agenda prevailing in the country, with the legislative body comprising of the land holding class inhibiting reforms, the suggestion of radical revolt by Dr. Saxena (2000)

of the Planning Commission is worth considering by the various stakeholders in the country.

7.3 Recommendation to the Madhya Pradesh Government

The banning of leasing according to the Land Revenue Code, 1960 has been unsuccessful, and the Madhya Pradesh Human Development Report, 1998 frankly admits that in Vidisha District, more than 70% of the land holdings are leased-in holdings. Share Cropping and Tenancy should be accepted as a reality, and tenancy reform measures needed to be introduced on the contractual terms. Such reform is possible, if the political and administrative will is there. The proactive policy of the current government provides an opportunity for the politicians, policy makers and bureaucrats to initiate changes in the legislation and concurrently work with bureaucracy to ensure implementation of the legislation. The machinery instituted under the Rajiv Gandhi Watershed Mission, which has proactively worked in implementing programmes, could be used to act as catalysts of change in the mission mould.

7. 4 Suggestions to ICRISAT and BAIF for the future intervention strategies

ICRISAT in its intervention in Lalatora village during the 1999 rainy season has facilitated in the promotion of better input practices by the usage of Thiram, Potash and Urea and the yield of the trial farmers ha been higher by 52.77% at 1.1. t ha^{-1} than other study villages which had an average yield of 0.72 t ha^{-1}. The suggestions for future intervention are:

1. The trial farmers in Lalatora villages were selected on technical considerations for monitoring the run off of soil and water. However these landlords are engaged in the exploitative share cropping 20:80 contract with the tenants of the tribal hamlet adjoining the village. It is suggested that future intervention strategies, should be sensitive to the equity aspects and the trial farmers should be chosen. Small and marginal farmers along with share croppers with own land holding could be selected in the watershed villages with due consideration of the technical factors.

2. Soybean is predominantly grown in Irrigable area, while most of the dry land is left uncultivated during the rainy season. ICRISAT could develop/evaluate and promote efficient rainwater management and input practices so that the dry land farmer's risk could be reduced in cultivating soybean in the dry land.

3. Waterlogging remains a major problem in this region, which is one of the significant causes of under investment of inputs due to the risk-aversion of the farmers. Technical solutions to this problem have to found and this has to be done in a participatory mode with the farmer so that adoption takes place.

4. BAIF's and ICRISAT'S interventions in the demonstration watershed area are considered by the farmers as a subsidised supply of inputs and not as a research intervention to improve yields. It is suggested that the future strategy should involve the charging of the input costs, at least to the extent of 50% with the rest of it being treated as a loan.

5. A strategy needs to be formulated for dissemination of input practices in the trial villages and other villages. A successful intervention in itself could create a demonstration effect to a , if the inputs are easily accessible at the local markets, this needs to be supplemented by a pro-active strategy of dissemination.

6. There is need for greater partnership with Socio-Economic Policy Program (SEPP) of ICRISAT for the natural resource management strategies to examine the equity and efficiency aspects of the intervention.

BAIF needs to play a proactive role in the selection of the trial farmers and develop a strategy for dissemination of input practices among farmers. The strengthening and linking of the dormant Self Help Groups with rural banks needs to be initiated and the recently initiated Swayam Siddha Project gives an opportunity. There is need to develop a programme to reach out to landless share croppers, particularly those who enter into the more exploitative 20:80 share cropping contract.

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