INTERCROPPING IN PAKISTAN: A CASE STUDY OF HYDERABAD SINDH

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ABSTRACT

The research is geared to correlate the enhanced agricultural productivity with intercropping. In order to test the validity of study objectives a workable methodology was designed. In this regard, a sample of 127 farmers was selected. Talukas Matiari, Hyderabad and Tando Allahyar in district Hyderabad[1] were selected as the study area. Study reveals that demographic trends in the study area are same as elsewhere in Sindh. For example more than 55 per cent *respondents replied that they were living in joint family structure. Out of total 127 respondents, 40 adopted intercropping; study reveals significantly higher crop yield and crop incomes of those farmers who adapted intercropping.*

Key Words: Intercropping, Progressive farmers, Crop yields, Income, Sampling methods

INTRODUCTION

Intercropping is the practice of cultivating an additional crop in the spaces available between the main crop. It is a practice often associated with sustainable agriculture and organic farming. It forms a part of polyculture. Examples of intercropping strategies are planting a deep-rooted crop with a shallow-rooted crop, or planting a tall crop with a shorter crop that requires partial shade. This paper describes benefits of intercropping in terms of higher crop yields, and crop incomes. It is divided into three parts. Part one reviews literature; part two explains analytical tools and results, and part three provides conclusion and recommendations.

[1] At the time of study design these *taluka* were the part of district Hyderabad and at present each of them is a separate district.

REVIEW OF LITERATURE

The goal of intercropping is to produce a greater yield on a given piece of land by making use of space that would otherwise be wasted with a single crop. Careful planning is required, taking into account the soil, climate, crops and varieties. It is particularly important to have crops competing with each other for space, nutrients, water or sunlight. Intercropping of compatible plants also encourages biodiversity by providing a habitat for a variety of insects and soil organisms that would not be present in a single crop environment. An example is the multi-tier system where coconut occupies the upper tier; banana the middle tier; and pineapple, ginger, or leguminous fodder, medicinal or aromatic plants the lower tier.

Intercropping is a system of cultivating two or more crops simultaneously in the alternate rows on the same piece of land. In other words, it is a process of growing subsidiary crops between two widely spaced rows of main crop, with the object of utilizing the space left between two rows of main crop and to obtain more production per unit area.

Ruthenberg (1980) reported that intercroping is a means of yield increase, moisture saving, risk reduction and fertilizer efficiency. Makonen (1981) argued that intercropping utilizes a greater total volume of soil efficiently by differential root system with varing cation exchange of different companion crops. According to M.H. Leghari *et. al.* (2004) various methods are being applied to increase productivity of agricultural crops particularly vegetables. Wiley and Rao (1981) advocated that higher yields and greater returns per unit area could be achieved through mixed cropping than single crop. Motha, *et. al.* (1983) reported that land equivalent ratio increased by 9 per cent with intercropping than sole crop.

To sum up, intercropping is recommended by many investigators for small landholders in the areas having diversified farming system. Pakistan possesses all congenial conditions for intercropping. The region is climatically well suited to greatly expand agricultural production. Crops can be grown throughout the year where water is available. In order to improve the socio-economic status of farming community, which constitutes the

majority of small landholders, their farm income could be enhanced by popularizing intercropping of component crops.

RESEARCH METHODS

At first stage, *talukas* Matiari, Hyderabad and Tando Allahyar in district Hyderabad were purposively selected for study purposes. At second stage, sample of 127 farmers was selected (see table 1). The selection criterion was largely based upon the rationale that all these *talukas* were similar in terms of the agro-economic zones, resulting in similar cropping pattern, land holding ownership and farmer's activities in managing the farms. Besides, for the study purpose it was relatively easier to locate progressive and non-progressive farmers which were one of the prerequisite for accomplishing study objectives. In addition, various other factors such as the trends in population growth rates and literacy were also used as the selection criteria. Extensive survey using questionnaire, based upon checklists and pre-testing was used to collect primary data. Besides, various stakeholders were visited and interviewed to supplement the data.

Table -1: Intercropping Among Sample Farmers N = 127

Study Area	Total Sample Farmers	% with Intercropping
Hyderabad	58	34 (20)
Matiari	32	31(10)
Tando Allahyar	37	27(10)
All Cases	127	31(40)

Note: Figures in () = Number of Cases

RESULTS AND DISCUSSIONS

Figure-1 indicates farm size in sample watercourse area. 51 per cent of the farmers having the holding of 1-12 acres and the 30 per cent hold 13-25 acres and the rest i.e. 19 per cent have more than 25 acres of land holding. The land ownership patterns are similar in all these three *talukas* with no significant variation

@95% CI (class interval). These findings are further supplemented through figure 2 that shows farm size in all sample watercourses.

Figure 1: Land Ownership Patterns in Sample Talukas N=127

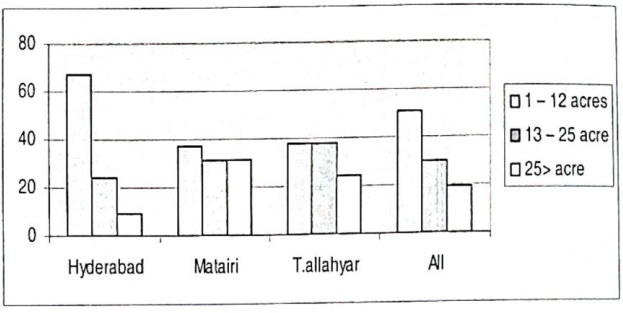

Figure -2 displays the farm size in the sample watercourses. Data highlights that 51 per cent of total sample farmers fall in the land ownership category between 1-12 acres. Similarly, 38 per cent farmers belonged to land ownership category of 13-24 acres. Remaining 19 per cent farmers owned above 25 per cent land.

Figure 2: Farm Size in the Study Area N=127

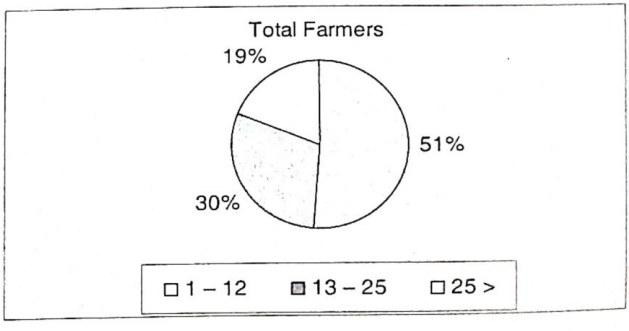

Table 2
Comparison of Crop Yields and Net Incomes between Progressive and Non-progressive Farmers

N=127

Crops	With Intercropping			Without Intercropping			Net Differences in Income
	Yields	Costs	Net Income	Yields	Costs	Net Income	With intercropping
Wheat with Oil seed #	173000	8656	6685	24600	15175	5525	1160
Wheat with Sugarcane #	44800	27150	15700	50900	32875	14125	1575
Sugarcane with Onion #	116900	44550	70400	106900	28225	44775	25625
Net Incomes from Crops #	-	-	**92785**	-	-	**64425**	**28360**

Source: Survey Data, 2004.
Differences are significant at 95 per cent CI

Table 2 demonstrates that the progressive farmers who use minimum two crops on one acre of land significantly gained higher net crop incomes as compared with non-progressive farmers who chooses minimum two acre of land to grow two different crops. The intercropping assisted progressive farmers to efficiently utilize land; it also helped him to efficiently use inputs such as fertilizers, pesticides and irrigation supplies. Although average crop yields reported by the progressive farmers is low to that of non-progressive farmers. However, the cost of production between two farmers is major differences, as cost to produce two crops in two acres of land by non-progressive farmers is significantly high to that of progressive farmers. The data suggests that progressive

farmers significantly registered higher net return (i.e.Rs.28360) to that of non-progressive farmers.

The differences between input costs between both farmer groups are largely because of separate harvesting and cutting of two crops. Progressive farmers pay the cost of one acre of harvesting and cutting for both crops, where as non-progressive farmers pay the cost of two acres of harvesting and cutting for both crops. The estimated transport cost paid by non-progressive farmers for both crops is Rs.9300. On other hand, progressive farmers pay Rs.8300 for both crops put together. Similarly, productivity of wheat under intercropping is significantly low largely because substantially less area in one acre with wheat was cultivated. Thus differences in productivity are based on area set for the crop cultivation and not in terms of yields achieved by progressive and non-progressive farmers. The fixed cost includes *Abiana* (water charges) of Rs.350, land tax of Rs.150. and land rent estimated at Rs.1800 per acre.

REGRESSION ANALYSIS

In order to examine the relationship of crop incomes by progressive and non-progressive farmers multiple regression analyses were carried out. Independent indicators i.e., full time on agriculture, literacy levels by progressive and non-progressive farmers were used in the following equation:

Crop income = Crop yield +Multi cropping +Literacy +Fulltime farmer

$$Y = CY + MC + Lit + FT \ldots\ldots\ldots \mu$$

Whereas,

Y = Crop Income of the Respondents and Dependent Variable

CY = Dependent Variable Indicates Crop Yields

MC = Multi Cropping (Dummy) 0=Yes, 1=No

FT = Dependable Variable Denoting Time Spent by Respondent (Dummy Variable 0=Yes, 1=No)

Regression	Co-efficient	SE	T-value
Inter cropping	5.8102	.2968	13.017
CY	2.4421	.4630	3.174 (.31)
MC	3.452	.3341	4.121 (.032)
LT	4.6320	.3261	5.432 (.21)
FT	4.4320	.41270	4.632 (.24)

R^2= 0.7494, Mean of dependent variable 6.8421

D.W= 1.7029

The analysis demonstrates that almost 75 per cent of variation in dependent variable i.e. Y is because of changes in the independent variables. T-values, significant in all, indicate that these significant differences between crop incomes reported by the progressive and the non-progressive farming. Besides, changes in yields obtained by the farmers by both categories (i.e., both progressive and non-progressive farmers) are significantly different as progressive farmers tend to achieve higher yields to that of the non-progressive ones. Finally Durbin Wilson at 1.7029 shows statistical relationship between the variables used in this equation.

CONCLUSIONS AND RECOMMENDATIONS

The study demonstrated that symmetrical distribution of land ownership patterns in all three sample Talukas was observed. The farmers through efficient resources management obtained higher net crop incomes. The Intercropping is largely adopted by those who fall under category of progressive farmers who gained high crop incomes. Inter intercropping requires skillfulness, hard work and close relationships with the line agencies. Therefore, only those farmers who intend to qualify above parameters opt for intercropping. In order to encourage intercropping, efforts be made at policy levels to influence more and more farmers towards intercropping practices. To achieve this, it is suggested that a close liaison between the farmers & non-government organization could play an effective role.

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