

## Popularization of Intercropping to Increase Profitability in District Kushinagar, U.P

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### Abstract

*Despite having attained a spectacular food grain production of more than 278 million tonnes, there are millions of food unsecured and under nourished people in India. Supply food for such a population is a big challenge for farming community resultantly agriculture people should optimize the use of resource. Krishi Vigyan Kendra is working for the transfer of technologies like inter cropping with the emphasis on the use of resources. A survey was conducted with the objective to assess the adoption of intercropping by the farmers to increase profitability. The total 150 Farmers from 5 villages namely Padripiperpati from block Bishunpura, Piperaghat from block Seorahi, Purena Katiya from block Tamkuhi Raj, Premwalia from block Kasia and Manjharia from block Dudahi was interviewed. The result revealed that in one year cropping pattern 37.99% farmers were doing intercropping in main(base) crops of Sugarcane, Banana and Bitter gourd. The oilseed crop toria, pulse crop green gram, vegetable crop cauliflower, coriander and spice crop turmeric were the selected intercrops. It was observed that by adoption of intercropping the yield / ha can be increased from 2.25% to 52.92 % with the average increase of 14.05% and net return can be increased from 16.67% to 93.59 %with the average increase of 47.55%. Therefore, it may be concluded that in the one year cropping pattern inclusion of one intercrop can increase the profitability of farmer's and availability of food for under nourished people*

**Key words –cropping pattern, soil, sugarcane, banana, bitter gourd, Intercropping**

### Introduction

Supply food to such a growing population of country like India is a challenge, and resultantly farming community should optimize the use of resources mainly soil, and the soil management is important for healthy food production<sup>[3]</sup>. Efficient use of natural resources in the face of high population density is important and consequently food insecurity is overwhelming for specially developing countries<sup>[1,4,7]</sup>. The population pressure on land and water resources has led to the excessive exploitation of natural resources and increased soil losses<sup>[5]</sup>. In order to reduce the soil degradation and

### Material and Methods

Krishi Vigyan Kendra (ICAR-IIVR, Varanasi), Kushinagar conducted various training programmes, on farm trials, demonstrations and extension activities to aware farming community about inter cropping and after that to

enhance the eco-system sustainability, various strategies such as use of cover and buffer strips and mulching are reported elsewhere<sup>[2]</sup>. Intercropping is one of the most adoptable practice which refers to growing two or more crops simultaneously on the same piece of land with a definite row-planting pattern to obtain higher yield per unit area. Considering the profitability of the intercropping, Krishi Vigyan Kendra planned a survey with the objectives to find out the impact of intercrop on profitability in yield/unit area and to assess the profitability in income.

assess the popularity of the intercropping farming system, the farmers of district Kushinagar was selected. Five blocks from the district Bishunpura, Seorahi, Tamkuhi Raj, Kasia & Dudahi were selected purposively. One village from each block

was selected purposively i.e., villages Padripiperpati from block Bishunpura, Piperaghat from block Seorahi, Purena Katiya from block Tamkuhi Raj, Premwalia from block Kasia and Manjharia from block Dudahi and interviewed during training programmes, group discussion and individual contact.

**Results and Discussion**

**Crop grown in one year cropping pattern;** Data on Distribution of farmers according to crop grown in one year cropping pattern(Table-1) showed that Sugarcane, Banana and Bitter gourd were the selected base crops and Toria, Green gram, Coriander ,Cauliflower and

From each village thirty farmers were selected for data collection in the year 2017-2018. The data on selected base crops, selected intercrops, yield of intercrop yield of main crop, cost of cultivation and net return were collected and statistically analyzed.

Turmeric were the selected inter crops .It is clear that maximum number of farmers i.e.35.33% grew sugarcane as a sole crop in one year cropping pattern while the minimum number of farmer’s i.e.,03.33% were growing the Banana+ Coriander in one year cropping pattern<sup>[6]</sup>.

**Table 1 Distribution of farmers according to crop grown in one year cropping pattern**

S.No	Crops grown	Frequency	Percentage
1.	Sugarcane as a sole crop	53	35.33
2.	Sugarcane+ Toria	21	14.00
3.	Sugarcane+ Green gram	12	08.00
4.	Banana as a sole crop	19	12.67
5.	Banana + Coriander	05	03.33
6.	Banana + Cauliflower	09	06.00
7.	Bitter gourd-Sponge gourd-Pea	21	14.00
8.	Bitter gourd+ Coriander-Sponge gourd-Pea	06	04.00
9.	Bitter gourd + Turmeric - Radish - Spinach	04	02.67
5	Total	150	100.00

**Impact of intercrop on yield/unit area;** Data presented in table-2 revealed that by inclusion of one inter crop in one year copping pattern increased at least 2.25% yield/unit area and it reached to maximum increase of 52.29 % yield/unit area. On an

average 14.04 % increase in yield may be obtained per hectare. The average yield of sole crop was found 491.67 q/ha whereas by adoption of one inter crop significantly increased the yield/ha from 491.67q/ha to 547.65 q/ha.

**Table 2 Yield per hectare in one cropping pattern and percent increase due to intercropping**

S. No	Crops grown	Yield(q/ha)	% increase in yield
1.	Sugarcane as a sole crop	695.00	-
2.	Sugarcane+ Toria	710.65	02.25
3.	Sugarcane+ Green gram	747.22	07.51
4.	Banana as a sole crop	438.00	-
5.	Banana + Coriander	457.00	04.34
6.	Banana + Cauliflower (Kharif)	478.00	09.13
7.	Bitter gourd-Sponge gourd-Pea	342.00	-
8.	Bitter gourd+ Coriander-Sponge gourd-Pea	370.00	08.19
9.	Bitter gourd + Turmeric-Radish-Spinach	523.00	52.92
	<b>Mean yield of Base Crop</b>	<b>491.67</b>	<b>-</b>

	<b>Mean yield of Inter crop</b>	<b>547.65</b>	<b>14.05</b>
	<b>S.E.(diff)=215</b>		
	<b>C.D.(0.05)=455</b>		
	<b>F value=734.76**</b>		

\*\*Highly significant at 01% level of significance

### Impact on net return & household income:

Data on economics of Crops grown in one year cropping pattern given in table-3 showed that by cultivation of Banana + Cauliflower (Kharif) the highest increase i.e.,93.59% in household income was obtained whereas by cultivation of Sugarcane+ Toria the lowest

increase i.e., 16.67% in household income was earned. The average increase of 47.55% in household income was observed with intercropping in comparison to sole crops .Although, respondents reported that the net return was much influenced by the market rate and the market demand.

**Table 3 Economics of Crops grown in one year cropping pattern**

S.No	Crops grown	Gross Cost	Gross Return	Net Return	B:C Ratio	% increase in income
1.	Sugarcane as a sole crop	98300	226119	127540	2.3:1	-
2.	Sugarcane+ Toria	106340	259284	152944	2.43:1	16.67
3.	Sugarcane+ Green gram	108285	274932	166647	2.54:1	23.46
4.	Banana as a sole crop	180500	416100	235600	2.31:1	-
5.	Banana + Coriander	210450	543500	333050	2.58:1	41.36
6.	Banana + Cauliflower (Kharif)	229800	685900	456100	2.98:1	93.59
7.	Bitter gourd-Sponge gourd-Pea	149250	391150	241900	2.62:1	-
8.	Bitter gourd+ Coriander-Sponge gourd-Pea	169300	519300	350000	3.06:1	44.69
9.	Bitter gourd + Turmeric- Radish-Spinach	169480	569900	400420	3.36:1	65.53
	<b>Mean of economics of main crop</b>	<b>142683.33</b>	<b>344456.33</b>	<b>201680</b>	<b>2.41:1</b>	<b>-</b>
	<b>Mean of economics of main crop with inter crops</b>	<b>165609.2</b>	<b>475469.3</b>	<b>309860.2</b>	<b>2.83:1</b>	<b>47.55</b>
	<b>S.E.(diff)</b>	<b>66055</b>	<b>224914</b>	<b>164727</b>		
	<b>C.D.(0.05)</b>	<b>149030</b>	<b>476794</b>	<b>349204</b>		
	<b>F value</b>	<b>51.65**</b>	<b>364.00**</b>	<b>308.46**</b>		

\*\*Highly significant at 01% level of significance

### Conclusion

It may be concluded from the above discussion that Inter cropping is a complex suite of new resource-efficient technologies, which possess the capability to improve soil, air, and water quality; increase net return and land equivalent ratio; and control weeds and pest infestation. Inter cropping compensates the yield loss of main crops by providing additional income from inter crops. Furthermore, inter cropping maintains a natural ecosystem via crop diversification. As the district Kushinagar is the important sugarcane ,Banana and Bitter gourd grower, the potential for more inter cropping is good.

Therefore, more research is inevitable to further improve its adoption especially regarding the interaction of its key components with local soil and climate conditions. More On farm-research, development and demonstration of the production potential of this system is required, including economic analysis and farm budgeting at regional and global levels. For an inter crop combination to be biologically advantageous, agro techniques such as fertilizer application, seed rate of intercrop and base crop, and selection of suitable genotypes must be taken care of to reduce the depressing

effect of inter crops on sugarcane and to increase the productivity and profitability of

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the inter cropping system.