

PERFORMANCE OF DIFFERENT WHEAT (*TRITICUM AESTIVUM L.*) BASED INTERCROPPING SYSTEMS UNDER IRRIGATED CONDITION

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ABSTRACT

Result of the field experiments conducted during the *rabi* seasons of 1996-97 and 1997-98 at the demonstration farm of K. V. K. Khumtai, Golaghat, Assam revealed that intercropping systems of wheat with lentil (*Lens culinaris* Medikus) and pea (*Pisum sativum L.*) produced higher wheat equivalent yield (WEY) as compared to their sole cropping. Sole rajmash (*Phaseolus vulgaris L.*) produced highest (WEY) net return and benefit : cost ratio in both the years. Among the different intercropping treatments, wheat + rajmash produced significantly higher WEY and also higher net return and benefit : cost ratio. Land equivalent ratio (LER) calculated from combined intercrops yield were also higher than sole crops in both the year.

INTRODUCTION

Wheat (*Triticum aestivum L.*) is the second important cereal crop next to rice which is grown during *rabi*. In Assam sowing time of wheat coincides with that of some of the important pulse crops like lentil (*Lens culinaris* Medikus), pea (*Pisum sativum L. sensu lato*) and rajmash (*Phaseolus vulgaris L.*). Under such circumstances, these pulse crops may be suitably adjusted in between rows of wheat. Intercropping of wheat and pulse crops has been in practice for a long time in wheat growing areas of the country but to get the best result, a rational approach is needed and desired information is required. Keeping this view in mind, a field experiment was undertaken to study the production potential of different wheat based pulse intercropping systems over sold cropping.

MATERIALS AND METHODS

An investigation was carried out at the demonstration farm of Krishi Vigyan Kendra, Khumtai, Golaghat, Assam, during *rabi* seasons of 1996 - 97 and 1997 - 98. The soil was sandy loam with pH 5.1, high in organic carbon, low in available nitrogen and phosphorus and medium in available potassium. The treatments consisted of sole wheat (var. Sonalika), sole rajmash (var. Uday), sole lentil (var. B - 77), sole pea (var. Azad) and intercropping of wheat with each of rajmash, lentil and pea in 1 : 1 and 2 : 2 ratio, were laid out in randomised block design with three replications. All the crops were sown in rows 25 cm apart. Sole crops were fertilized with their recommended doses. In case of intercropping, only recommended

doses of fertilizer of wheat were applied in the rows of wheat and pulses and no separate doses were maintained for intercrops. All crops were grown under irrigated condition with recommended plant protection measures and were harvested at maturity stage of each crop. Grain yields were recorded after harvesting and WEY were computed based on the market prices of wheat, lentil, pea, and rajmash.

RESULTS AND DISCUSSION

Yield of wheat and intercrops

The highest grain yield of wheat was obtained with sole planting and the lowest when wheat was intercropped with lentil in 2 : 2 ratio in both the years (Table 1). The grain yield of wheat decreased in all the intercropping systems as compared to pure crop of wheat. Similarly, sole crop of rajmash, lentil and pea also gave higher grain yield / ha than when grown as intercrop during 1996 - 97 and 1997 - 98. The higher grain yields of wheat and intercrops in pure stands were mainly due to higher plant density under sole cropping compared with intercropping combinations.

Table 1. Grain yield and wheat equivalent yield of wheat based intercropping systems

Treatment	Grain yield (t / ha)				Wheat equivalent yield (t / ha)	
	1996 - 97		1997 - 98		1996 - 97	1997 - 98
	Main crop	Inter crop	Main crop	Inter crop		
Sole wheat	3.0	-	3.1	-	2.0	3.1
Sole rajmash	-	1.2	-	1.2	4.8	4.7
Sole lentil	-	0.94	-	0.9	2.6	2.5
Sole pea	-	1.1	-	1.1	3.4	3.5
Wheat + rajmash (1:1) 1.8	0.7	1.8	0.7	4.6	4.6	
Wheat + lentil (1:1) 1.8	0.6	1.8	0.6	3.5	3.6	
Wheat + pea (1:1) 1.7	0.6	1.8	0.6	3.4	3.6	
Wheat + rajmash (2:2) 1.7	0.8	1.7	0.8	4.6	4.6	
Wheat + lentil (2:2) 1.6	0.7	1.7	0.7	3.6	3.6	
Wheat + pea (2:2) 1.8	0.7	1.8	0.7	3.9	4.0	
C.D. (P= 0.05)	0.4	0.4				

Wheat equivalent yield (WEY)

Sole cropping of rajmash produced highest WEY in both the years which was significantly higher than all other treatments except intercropping of wheat with rajmash in both the ratios. The highest yield of sole rajmash was mainly because of higher economic value of rajmash than all other crops. Except sole cropping of rajmash, all the sole crops gave lower WEY than all the intercropping treatments in both the years. Additional advantage of intercrop yield and higher economic value of rajmash, lentil and pea were responsible for higher wheat equivalent yield. Similar results were also obtained by Singh and Singh (1993). Among the

different intercropping systems, intercropping of rajmash with wheat under 2 : 2 series produced significantly highest WEY than all other intercropping treatments except wheat + rajmash in 1:1 ratio. This was mainly higher yield of rajmash than other intercrops in their respective intercropping system and also due to higher economic value of rajmash.

Land equivalent ratio (LER)

LER calculated from combined intercrop yield were always higher than sole crop in both the years. This indicated greater biological efficiency of intercropping treatments. Similar beneficial effect of intercropping on land utilization was also reported by Frances *et al* (1978) and Shah *et al* (1991).

Economics

Sole cropping of rajmash gave the highest net return and benefit : cost ratio, followed by intercropping of rajmash with wheat in 2:2 ratio. This higher net return and benefit :cost ratio were mainly due to higher yield of rajmash and also due higher economic value of rajmash. The lowest net return was obtain under sole lentil in both the years whereas lowest benefit : cost ratio was obtain under sole wheat.

Table 2. Land equivalent ratio, net return and benefit : cost ratio in wheat based intercropping systems

Treatment	Land equivalent ratio		Net return (Rs/ha)		Benefit : cost ratio	
	1996 - 97	1997 - 98	1996 - 97	1997 - 98	1996 - 97	1997 - 98
Sole wheat	1.0	1.0	8435	9020	0.8	0.9
Sole rajmash	1.0	1.0	18000	17500	1.4	1.4
Sole lentil	1.0	1.0	8220	7860	.94	0.9
Sole pea	1.0	1.0	10200	11400	1.0	1.1
Wheat + Rajmash (1:1)	1.2	1.2	11125	16875	1.3	1.3
Wheat + Lentil (1:1)	1.3	1.3	13060	13420	1.2	1.2
Wheat + pae (1:1)	1.1	1.1	11380	12945	1.1	1.2
Wheat + Rajmash (2:2)	1.2	1.2	16956	16900	1.3	1.3
Wheat + Lentil (2:2)	1.3	1.3	12730	12860	1.2	1.2
Wheat + Pea (2:2)	1.2	1.2	14380	14040	1.3	1.3

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