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PERFORMANCE OF MAIZE (*ZEA MAYS*, L.) AS PURE/INTER CROPPING UNDER VARYING ROW RATIOS

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ABSTRACT

An experiment were initiated during the *kharif* season of four consecutive years from 1995 to assess the productivity of maize grown as sole and intercropped with groundnut and soybean under varying row ratios in mid hills (950 M, msl) upland terraces of Meghalaya. The results revealed that the mean maize yield was highest in pure stand whereas highest mean maize equivalent yield (MEY) was recorded with maize + groundnut (1:2) intercropping followed by 2:2 row ratio. For maize + groundnut/soybean revealed that average MEY was higher in both inter cropping systems as compared to sole cropping of maize (34.25 q/ha).

MATERIAL AND METHOD

Field experiments were conducted during 1995-1998 at the ICAR Research Complex Farm, Umaim (950 m.msl). The soil of the experimental plot was alfisol, acidic (pH 5.21), poor in available phosphorus (6.2 kg/ha), medium in K content (300 kg/ha), organic carbon 1.23% and total soil N 560 kg/ha. The average annual rainfall during the four years was 2080.5 mm. The experiments consisted of seven treatments, viz. T-1 = Maize (Sole), T-2= Maize + Groundnut (1:1); T-3 = Maize + Groundnut (1:2); T-4 = Maize + groundnut (2:2); T-5 = Maize + soybean (1:1); T-6 = Maize + Soybean (1:2); T-7 = Maize + Soybean (2:2) were laid out in a randomised block design with three replications.

The dose of fertiliser applied for maize were, 100:60:40, while for groundnut and soybean intercrop it was 20:60:40 kg NPK/ha. The maize (Vijay composite) was sown during last week of April each year and harvested in the September end in each year. Groundnut (ICGS-76) and soybean (JS 80-21) were sown as inter crops in between maize under schedule row ratios (1:1, 1:2 & 2:2). The groundnut and soybean were harvested during October every year. All the recommended agronomic practices were followed for maize and intercrops. Fertiliser doses were applied 50% at sowing and rest 50% at knee high stage and at tusselling stand in maize crop, while inter crop received full recommended dose at sowing.

RESULTS AND DISCUSSION

The data of maize equivalent yield (MAY) for maize + groundnut/soybean revealed that average MEY was higher in both inter cropping systems viz; maize + groundnut (48.46 q/ha); maize + soybean (41.36 qha) of MEY as compared to sole cropping of maize (34.25 q/ha). In both inter croping systems 1:2 row ratio of maize and legume component produced highest maize equivalent yield, i.e. maize + groundnut (51.31 q/ha) and maize + soybean (45.9 q/ha) followed by 2:2 row ratio in respect of maize + groundnut (47.19 q/ha) and 1:1 row ratio in respect of maize + soybean (41.0 q/ha). Munda, et al (1999) reported highest grain yield (118.9 q/ha) in terms of MEY due to maize (green cob) - groundnut - mustard cropping sequence in mid hill terrace land. Inclusion of pop corn + sunflower + groundnut - mustard cropping sequence also fetched 110.5 q/ha of MEY.

Performance of maize (sole)

Maize pure stand had registered 37.0 and 37.5 q/ha q/ha of grain yield during 1995 and 1997. However the yield was reduced during 1996 (30.2 q/ha) and 1998 (32.3 q/ha). This may be due to low rainfall during cropping season of the respective years. The mean maize grain yield of four years was 34.25 q/ha.

Performance of intercrops

Among the different cropping systems, maize + groundnut inter cropping system was proved to be superior as compared to maize + soybean inter cropping system. Maize + groundnut (1:1) recorded a mean yield of 46.8 q/ha of MAY. During 1996, the crop registered maximum MEY (49.95 q/ha) and 44.8 q/ha respectively. Maize + groundnut (1:2) row ratio proved to be best among all the cropping systems and produced a mean MEY of 51.3 q/ha. This cropping system (1:2) recorded maximum MEY during 1997 (57.1 q/ha) followed by 1996 (51.2 q/ha) and 1998 (48.25 q/ha) and 1995 (45.2 q/ha).

The cropping system with maize + groundnut paired rows (2:2) was also proved to be superior to 1:1 row ratio and registered a total mean MEY of 47.1 q/ha. Under maize + soybean inter cropping system, the 1:1 row ratio produced a mean MEY 41.1 q/ha. During 1997 this inter cropping system recorded highest (42.8 q/ha) of MEY followed, 1995 (40.189 q/ha), 1998 (39.0 q/ha) and 1996 (39.9 q/ha). Maize + soybean (1:2) was however superior to 1:1 row ratio and produced a mean MEY of 45.9 q/ha. During 1999, this treatment exhibited maximum MEY yield (49.9 q/ha) followed by 47.7 q/ha of MEY during 1995. However the yield was lowest during 1997 and 1998. Maize + soybean paired rows (2:2) was found inferior to all the inter cropping system which could yield only 37.3 q/ha of MEY. During first year of study, this treatment produced 31.1 q/ha which was at par with 1996. However in 1997 and 1998, paired rows of maize with soybean produced slightly higher MEY (Table 1).

In both the inter cropping system, 1:2 row ratio of maize legume component produced highest MEY 51.3 q/h), while maize + soybean could fetch only 45.0 q/ha of MEY during all the years of study. Singh (2001) reported that maize + ginger intercropping (1:1) at 100:80:60 kg NPK/ha was found promising and produced maximum MEY.

The total rainfall received during 1997 was 2041.26 mm and was much higher than the preceeding year 1996 (1773.5 mm) which enabled to register a good yield from individual crops. However, total precepetation was more during 1995 with 2282 mm and 2622.3 mm in 1998 but distribution was uneven and low during peak period of crop growth which ultimately affected in total yield from individual crops during these two years. Malvia et al (1980) reported that inclusion of groundnut in maize as an inter crop proved to be suitable for obtaining maximum MEY. Inclusion of forage/fodder as inter crop also proved beneficial with maize and produced 450 q/ha of forage in such inter cropping system (Chatterjee et al, 1978). Patel et al (1986) reported higher productivity of groundnut in upland terraces than existing cereals like maize/rice in Meghalaya.

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Table 1. Effect of row ratios on the yield of maize and maize + groundnut/soybean intercropping system

Treatments cropping system	Grain yield q/ha 1995			Grain yield q/ha 1996			Grain yield q/ha 1997			Grain yield q/ha 1998			Mean maize equivalent yield q/ha		
	Maize	Oilseed	Mey	Maize	Oilseed	Mey	Maize	Oilseed	Mey	Maize	Oilseed	Mey	Maize	Oilseed	Mey
Maize (pure)	37.00	-	37.00	30.20	-	30.20	37.50	-	37.50	32.30	-	32.30	34.25	-	34.25
Maize + groundnut (1:1)	5.70	47.00	25.70	9.70	49.90	35.00	2.27	44.80	25.30	7.80	45.80	29.5	6.47	46.88	
Maize + Groundnut (1:2)	31.00	7.19	45.20	23.20	11.20	51.20	33.30	9.50	57.10	25.70	9.10	48.25	27.67	9.25	51.31
Maize + Groundnut (2:2)	28.50	1.98	45.9	24.40	10.30	42.20	34.70	7.50	53.50	23.90	9.30	47.15	28.75	7.27	47.19
Maize + Soybean (1:1)	32.00	5.45	40.10	21.90	9.00	39.90	33.70	4.90	42.80	20.60	10.10	40.80	27.00	7.36	41.10
Maize + Soybean (1:2)	32.00	11.9	47.7	30.3	14.00	49.95	30.00	9.28	43.00	30.20	9.14	43.00	30.37	11.08	45.90
Maize + Soybean (2:2)	28.10	2.57	31.7	26.3	2.71	30.1	31.70	7.92	42.80	32.40	9.21	44.30	29.3	5.60	37.20
CD (0.05)			3.26			2.12			6.31			3.23			