Effect of Land Configurations and Varieties on yield and Economics of Summer Groundnut

Abstract

The field investigation was conducted at experimental farm, Department of Agronomy, College of Agriculture, VNMKV, Parbhani, during summer season to find out results of yield and economic parameters. The experimental field was levelled and well drain. The soil was clay in texture, low in nitrogen, medium in phosphorous, medium in potash and alkaline in reaction. The experiment was laid out in a Split plot design with 12 treatment combinations, which comprised of four land configurations and three varieties. The main plots treatments were L_1- Ridges and furrows, L_2- BBF, L_3- Sara method and L_4- Flat beds and varieties were LGN-1, TAG-24, and SB-XI. Each experimental unit was replicated three times. Amongst land configuration BBF recorded significantly higher yield parameters viz., Dry pod yield plant^{-1} (g), 100 kernel weight (g), kernel yield (kg ha^{-1}), Dry pod yield (kg ha^{-1}), haulm yield (kg ha^{-1}), biological yield (kg ha^{-1}), harvest index (%) and in Economic parameter gross monetary returns (Rs ha^{-1}), net monetary returns (Rs ha^{-1}) and Benefit cost ratio (%) followed by Ridges and furrows. Among the varieties TAG-24 recorded highest values of yield and economic parameters as compared to the varieties SB-XI and LGN-1.

Introduction

Groundnut, also called pea nut, earth nut, monkey nut, goober nut, manila nut, pinder and panda nut is a native of South American leguminous oil seed (Hammons, 1982). It was first found in Brazil or Peru as early as 950 B.C. (Higgins, 1951). According to Weiss (1983), a peanut was probably brought to West Africa from Brazil in the 16th century and then to the African East coast and to India. In India the plant was introduced by the Portuguese in 16th century as an oil seed crop for commercial cultivation. In the developed world, major pea nut produce is processed in to a variety of food products such as pea nut butter, salted pea nut, candies, salads, cheese and yoghurt like products, protein concentrate and pea nut meals (Chavan *et al*. 1990). Pea nut is fairly good source of some dietary minerals. The total minerals contains in pea nut ranges from 1.08 to 1.3 %. It contains (Mg per 100 g.) primary element such as Ca 50 to 90 mg, Mg 200 to 250 mg, P 340 to 430 mg, S 240 to 300 mg, K 500 to 730 mg and certain trace elements such as Mn 1.3 to 2 mg. Zn 2.3 to 4 mg, Boron 0.9 to 1.8 mg, Iron 2.3 to 3.2 mg. As groundnut helps to maintain blood cholesterol levels they have been recognized as heart friendly. Ground nuts provides over 30 essential nutrients are considered a rich source of fiber, vitamin (niacin, folate and vit. E) and minerals (Mg, Mn and P) and free

from Na. The vitamins contents in pea nut have been studied by several authors (Rao and Rao, 1981) and reported that pea nut have little or no vitamin A, D, K and B_{12}. Groundnut is a good source of all vitamins B except B_{12}. This is a rich source of thiamin, riboflavin, nicotinic acid and Vit E. The choline, inositol and pentathenic acid were present relatively higher amounts. India share 23 per cent of the world's groundnut area and production. In India, it is grown in area of 4.77 M ha with total production 4.75 MT. Above 80 % of the area under groundnut is concentrated in five states viz. Gujarat, Andhra Pradesh, Tamil Nadu, Maharashtra and Karnataka. Gujarat occupies the first place in regard to area and production. The average yield of groundnut in India is 999 kg ha^{-1}, which is less than the average yield of groundnut in world has 1600 kg ha^{-1}. Maharashtra is one of the important groundnut growing states in India. The total area under groundnut in Maharashtra is 3.57 lacks ha out of which 2.57 in kharif and 0.87 summer with total production of 4.44 lack tonnes with average yield of 1150 kg ha^{-1} (www.indiastat.com). The botanical name of groundnut, Arachis hypogaea L. is derived from Greek world Arachis meaning a legume and hypogaea meaning below ground, referring to the formation of pods in the soil. Ground nut belongs to the genus Arachis of sub-family papilionaceae of the family Leguminaceae Arachis hypogaea L. ssp. procumbent are always trailing, runner or spreading type with a central axis which does not bear inflorescence and has produce lateral branches, plant are late maturing and prostrate habit. The plants of Arachis hypogaea L. sp. fastigiated are always bushy upright erect or bunchy type with inflorescence in the central axis and without a regular pattern in the sequence of reproductive and vegetative branches. Fruits are concentrated around the central axis and plants are early maturing.

Materials and Methods

The field investigation was conducted at experimental farm, Department of Agronomy, College of Agriculture, VNMKV, Parbhani, during summer season to find out results of growth and quality parameters. The topography of experimental plot was fairly levelled. The soil was medium black in colour, and fairly well drained. The soil was clay in texture, low in nitrogen, medium in phosphorous, medium in potash and alkaline in reaction. The experiment was laid out in a Split plot design with 12 treatment combinations, which comprised of four land configurations and three varieties. The experiment was laid out in split plot design where in the main plot were assigned to four land configuration (Flatbed, Ridges and furrow, BBF and Sara method) and subplots to three varieties of groundnut (LGN-1, TAG-24 and SB-XI) and the treatment combinations were randomly replicated thrice. The treatments were allotted randomly to each replication. The gross plot size was 5.4 m x 4.2 m and net plot

size was 4.8 m x 3.8 m. The recommended dose of fertilizer was 25: 50: 00 kg NPK ha^{-1} which is applied through Urea and D.A.P.

Results and Discussion

The mean dry pod yield per plant in (g) was significantly influenced by the various treatments. The land configuration BBF recorded significantly higher dry pod yield per plant (7.38 g) followed by the land configuration ridges and furrows (7.22 g). Showed in table no. 1. Same result was reported by Hadvani *et al.* (1993). The data on dry pod yield per plant (g) revealed that the variety TAG-24 recorded significantly higher mean dry pod yield per plant (7.48 g) as compared to the other varieties SB-XI (6.96.g) and LGN-1 (6.74 g).

The effect of different land configuration on mean 100 kernel weight was found to be non significant. But the highest 100 kernel weight was observed by the land configuration BBF (45.90 g). This might be due to higher soil moisture availability showed in table no.1. The data presented in table no.1 100 kernel weight (g) revealed that the variety TAG-24 recorded significantly higher mean 100 kernel weight (46.43 g) as compared to other varieties SB-XI (42.25g) and LGN-1 40.00 g).

The effect of different land configuration on mean kernel yield (kg ha^{-1}) was found to be significant. The land configuration BBF recorded significantly higher mean kernel yield (1341 kg ha^{-1}) followed by the land configuration ridges and furrows (1246 kg ha^{-1}). This might be due to higher soil moisture and also more surface area for peg penetration. showed in table no.1. The TAG-24 recorded significantly higher mean kernel yield (1375 kg ha^{1}) as compared to the other varieties SB-XI and LGN-1. The varietal variation in yields might be due to differential genetic make-up. Similar result was reported by Ratankumar *et al (*2010) and Patra *et al* (1996).

Data presented in table no.1 on mean dry pod yield kg ha^{-1} as influenced by different land configuration was found to be significant. The land configuration BBF recorded significantly highest mean dry pod yield (1939 kg ha^{-1}) followed by the ridges and furrows (1835 kg ha^{-1}) land configuration with BBF 4% increased dry pod yield kg ha^{-1} over flat bed. This may be due higher dry pod weight, highest kernel easy harvesting and less pod retainment in soil. Same result was reported by Patel *et al.* (1995), Patra *et al.* (1996), Tirakannavar (1999) and Bheemappa (1993). The land configuration BBF recorded significantly higher mean haulm yield (2756 kg ha^{-1}) followed by the ridges and furrows (2688 kg ha^{-1}) as compared to all other land configurations. This may be due to all growth parameters are highest with BBF. Same

result was reported by Baskaran *et al.* (2003) Patil *et al.* (2007). The land configuration BBF recorded significantly higher mean biological yield (4729 kg ha^{-1}) followed by the land configuration ridges and furrows (4381 kg ha^{-1}) as compared to the all other land configurations shown in table no.1. Same result was reported by Baskaran *et al.* (2003).

The data in table no.1 on dry pod yield kg ha^{-1}, haulm yield kg ha^{-1}, biological yield kg ha^{-1} and kernel yield kg ha^{-1} revealed that the genotype TAG-24 recorded significantly higher mean dry pod yield (1999 kg ha^{-1}), haulm yield (2820 kg ha^{-1}), biological yield (4820 kg ha^{-1}) and kernel yield (1375 kg ha^{1}) as compared to the other varieties SB-XI and LGN-1. The varietal variation in yields might be due to differential genetic make-up. Similar result was reported by Ratankumar *et al (*2010) and Patra *et al* (1996).

Data presented in table no.1 on harvest index showed that there was no any significant effect by the different land configurations on harvest index. But the highest harvest index was observed (41.48 %) by the land configuration ridges and furrows as compared to other land configurations shows in table no.1. The harvest index it was revealed that the response of genotypes on harvest index was found to be non significant. But the highest harvest index was observed in the variety TAG-24 (41.43%) as compared to the other varieties SB-XI (39.81%) and LGN-1 (39.11%).

The presented in table no.2 data on gross monetary returns revealed that the land configuration with BBF recorded the maximum gross returns ha^{-1} (84469 Rs ha^{-1}) followed by ridges and furrows (80125 Rs ha^{-1}) as compared to the other land configurations. This may be due to higher pod yield and haulm with BBF. Similar result was recorded by Tarde (1984) and Baskaran *et al.* (2003). The net monetary returns per hector revealed that the land configuration BBF recorded highest net monetary returns per hector (59188 Rs ha^{-1}) followed by the land configuration ridges and furrows (54145 Rs ha^{-1}). Similar result was recorded by Tarde (1984) and Bheemappa *et al.* (1994). The data presented in table no.2 on benefit:cost ratio it was seen that the land configuration BBF recorded highest benefit:cost ratio (3.34) followed by the land configuration ridges and furrows (3.09) and land configuration Sara (3.03). The land configuration flat beds recorded the lowest benefit:cost ratio (3.00).

The gross monetary returns Rs ha^{-1} and net monetary returns Rs ha^{-1} revealed that the variety TAG-24 recorded significantly higher gross monetary returns (87047 Rs ha^{-1}) and net monetary returns (62325 Rs ha^{-1}) as compared to the other varieties SB-XI and LGN-1. This may be due to higher dry pod yield and haulm yield. Similar result was reported by

Chandapur (2012) and Meerasab *et al.* (2013). The benefit: cost ratio it was revealed that the variety TAG-24 recorded higher benefit: cost ratio (3.51) as compared to the varieties SB-XI (3.12) and LGN-1 (2.70).

The data presented in table no.2. on dry pod yield per plant (g), dry pod yield kg ha^{-1}, 100 kernel weight (g), haulm yield kg ha^{-1}, biological yield kg ha^{-1}, kernel yield kg ha^{-1} and harvest index revealed that the interaction effect of land configurations and genotypes on above yield and yield attributes was found to be non significant. The data presented in table no.2 on gross monetary returns Rs ha^{-1} and net monetary returns Rs ha^{-1} revealed that the interaction effect of land configurations and varieties on gross monetary returns and net monetary returns was found to be non significant.

Table no.1. Dry pod yield plant^{-1} (g), 100 kernel weight (g), and kernel yield (kg ha^{-1}), Dry pod yield (kg ha^{-1}), haulm yield (kg ha^{-1}), biological yield (kg ha^{-1}) and harvest index (%) of groundnut as influenced by various treatments.

Treatments	Dry pod Yield plant^{1} (g)	100 Kernel Weight (g)	Kernel yield (Kg ha^{-1})	Dry pod Yield (Kg ha^{-1})	Haulm yield (Kg ha^{-1})	Biological yield (Kg ha^{-1})	Harvest Index (%)
L) Land Configuration (L)							
L_1 - Ridges and Furrows	7.22	43.79	1246	1835	2688	4523	40.53
L_2 – BBF	7.38	45.90	1341	1939	2756	4729	41.48
L_3 - Sara method	6.84	42.78	1015	1642	2480	4089	40.0
L_4 - Flat bed	6.70	41.60	947	1553	2396	3950	39.11
SE $\pm$	0.047	0.22	12.26	26.16	23.02	39.62	-
CD at 5 %	0.16	NS	42.44	90.55	79.68	137.12	-
V) Varieties (V)							
V_1 - TAG-24	7.40	46.43	1375	1999	2820	4820	41.43
V2 - SB-XI	6.96	42.25	1078	1678	2516	4195	39.81
V3 - LGN-1	6.74	40.91	958	1549	2405	3954	39.11
SE $\pm$	0.045	0.18	13.29	13.75	19.82	40.93	-
CD at 5 %	0.13	0.54	39.84	41.23	59.44	122.71	-
Interaction (L x V)							
SE $\pm$	0.18	0.73	53.16	55.94	79.13	163.71	-
CD at 5%	NS	NS	NS	NS	NS	NS	-
General Mean	**7.03**	**43.2**	**1137**	**1742**	**2580**	**4323**	**-**

Table no. 2. Economics of the groundnut cultivation as influenced by various treatments

Treatments	Gross Monetary Returns (Rs ha^{-1})	Net monetary Returns (Rs ha^{-1})	Benefit cost Ratio
L) Land Configuration (L)			
L_1 - Ridges and Furrows	80125	25480	54645
L_2 – BBF	84469	25280	59188
L_3 - Sara method	71885	23780	48105
L_4 - Flat bed	68134	22780	45464
SE $\pm$	1065	-	788
CD at 5 %	3686	-	2729
V) Varieties (V)			
V_1 - TAG-24	87047	24597	62450
V2 - SB-XI	73437	23397	50040
V3 - LGN-1	67976	24997	43062
SE $\pm$	602	-	466
CD at 5 %	805	-	1397
Interaction (L x V)			
SE $\pm$	2409	-	1865
CD at 5%	NS	-	NS
General Mean	**76153**	**24330**	**51851**

Conclusion

Based on year experimentation, it is concluded that, Land configuration with BBF produced superior growth and dry pod yield per plant (g), dry pod yield kg ha^{-1}, 100 kernel weight (g), haulm yield kg ha^{-1}, biological yield kg ha^{-1}, kernel yield kg ha^{-1} and harvest index and it was comparable with the ridges and furrows. The variety TAG-24 was found superior in growth and development and dry pod yield per plant (g), dry pod yield kg ha^{-1}, 100 kernel weight (g), haulm yield kg ha^{-1}, biological yield kg ha^{-1}, kernel yield kg ha^{-1} and harvest index as compared to the variety SB-XI and LGN-1. The variety TAG-24 was found to be productive and remunerative. Highest GMR and NMR were recorded with BBF and it was comparable with other land configurations and among the varieties TAG-24 recorded highest GMR and NMR.

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