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EFFECT OF LAND CONFIGURATION WITH IRRIGATION REGIMES AND PLANT POPULATION ON WATER USE EFFICIENCY IN GROUNDNUT

N. MEYYAZHAGAN, A. AROKIARAJ, N. BALASUBRAMANIAM and A. CHRISTOPHER LOURDURAJ

Tamil Nadu Agricultural University
Coimbatore 641 003.

ABSTRACT

A field experiment on groundnut was conducted during 1992-93 at College of Agricultural Engineering, Kumulur to study the influence of land configuration with irrigation and plant population on water use efficiency. Results revealed that groundnut crop raised in ridges and furrows resulted in higher pod yield and water use efficiency when 4.25 cm of water was applied per irrigation than flat beds applied with 5.0 cm water. Reducing the irrigation water from 4.25 cm to 3.5 cm reduced the yield but the water use efficiency was maintained at a similar level indicating the efficiency of ridges and furrows in conserving applied water.

KEY WORDS: Groundnut, Land configuration, Irrigation, Water use efficiency.

Among oilseed crops, groundnut idisputedly enjoys a pre-eminent status in the lseed profile of the country both in terms of area well as production. It accounts for 48 per cent total oilseed production and 37 per cent of total lseed area in the country.

High yields of groundnut depend on two ctors viz., the genetic potential of the variety id required optimum environment suitable for alizing this potential. The groudnut crop quite ten does not express its full potential of yield cause of the limiting factors such as soil vironment, water availability, climatic factors, ant density and weeds. Land configuration actices were found to influence the yield of crops atel, 1989). Ridges and furrows are preferable to at beds under irrigated farming (Agasimani and abalad, 1991). Ridges and furrows have several stinct advantages like reduced contact area for ater on land surface thereby reducing crusting the soil and evaporation losses (Michael, 1978).

To achieve higher production and productivity groundnut, judicious use of water is a must. Of l the climatic and soil management factors that fluence corp growth in semi-arid regions, the teraction between supply and demand for water the main determinant of dry matter production. d yield and optimum plant density (Azam Ali *et* ., 1984). Considering these points, field periment was conducted to find out the possibility of increasing water use efficiency in groundnut.

MATERIALS AND METHODS

Field experiment was conducted at the farm of College of Agricultural Engineering, Kumulur, Trichirapalli district, Tamil Nadu during summer season of 1992 and 1993 under irrigated condition. The soil texture of the experimental fields was sandy loam, with the bulk density of 1.45 g/cc and field capacity and permanent wilting point were 15.8 and 5.0 per cent respectively. The infiltration rate was 8.0 cm/hr. No rainfall was received during the summer season of both the years. The cultivar TMV-7 with a duration of 100-105 days was the test corp for the study. The experimental trials were laid out in a split-plot design with three replications.

Flat beds irrigated with 5 cm depth of water, and three sets of ridges and furrows with 4.25, 3.75 and 3.50 cm were allotted to main plots. The plant population levels of 6.66, 5.00, 4.00 and 3.33 lakh plants per hectare were accommodated by altering the row spacing from 15 to 30 cm with an increment of 5.0 cm. The fifth sub-plot treatment was a paired row of 20/40 x 10 cm accommodating 3.33 lakh plants per hectare. The crops were sown on 14th and 21st January during the years 1992 and 1993 respectively. Three common irrigations were given to all the treatments. Thereafter irrigation was scheduled according to treatments

using a 90°V-notch for measurement of water. Irrigation / cumulative pan evaporation ratio of 0.8 was adopted upto 40 days and afterwards a ratio of 1.0 was adopted. Buffer channels were provided inbetween the plots and irrigation channels were lined with 100 micron thick polythene sheet to avoid conveyance losses. A blanket irrigation was given to the crop one day prior to harvest to facilitate easy pulling of the matured plants. A total of 13 irrigations were given for both the crops.

RESULTS AND DISCUSSION

Flat beds irrigated with 5 cm of water consumed 650 mm ; ridges and furrows irrigated with 4.25, 3.75 and 3.50 cm depth consumed 575, 525 and 500 mm of water respectively during the crop period of both the years of study.

Pod and haulm yields were significantly influenced by irrigation regimes through land configuration methods in both the years of study. Irrigation water applied at a depth of 4.25 cm through ridges and furrows recorded significantly higher pod yield. Flat bed irrigated at a depth of 5.0 cm was the next best and was comparable with 3.75 cm depth of irrigation water through ridges and furrows. Reducing the quantity of water to 3.5 cm reduced the yield.

The treatment with 4.0 lakh plants per hectare produced higher pod yield. Haulm yield increased with the increasing population.

Water use efficiency was significantly influenced by irrigation regimes through land configuration methods. Reducing the regimes to 4.25, 3.75 and 3.50 cm of water through ridges and furrows resulted in considerably higher water use efficiency than flat bed applied with 5.0 cm water. Higher water use efficiency was observed under 4.0 lakh plants per hectare.

Irrespective of the quantity of water applied, ridges and furrows promoted higher WUE than the conventional flat beds. Even reduced quantity of applied water (3.50 cm) did not affect the WUE though yield was reduced. Increase in WUE might be due to the favourable environment provided by the ridges and furrows resulting in more yield for the water applied indicating more conservation characteristics of the ridges and furrows for moisture. Decrease in WUE with increasing quantity of water applied was reported by Kadam and Patel (1992).

Higher WUE obtained with the population of 4.0 lakh plants per hectare might be due to efficient

Table 1. Effect of treatments on yield and water use efficiency in groundnut

Treatments	Pod yield (kg/ha)		Haulm yield (kg/ha)		Water use efficiency (kg/ha.mm)	
	1992	1993	1992	1993	1992	1993
Land configuration and irrigation						
1. Flat beds irrigated with 5 cm water	2383	2416	4585	4497	3.97	3.71
2. Ridges - furrows irrigated with 4.25 cm water	2741	2591	4758	4660	4.76	4.50
3. Ridges - furrows irrigated with 3.75 cm water	2489	2399	4509	4439	4.74	4.56
4. Ridges - furrows irrigated with 3.5 cm water	2377	2286	4421	4301	4.75	4.57
SE_d	52.5	30.1	61.5	49.3	0.15	0.13
CD	127.8	73.8	150.5	120.8	0.36	0.31
Plant population - geometry						
1. 6.00 lakh plants/ha (15 x 10 cm)	2487	2387	5786	5484	4.44	4.27
2. 5.00 lakh plants/ha (20 x 10 cm)	2602	2439	5179	5024	4.65	4.36
3. 4.00 lakh plants/ha (25 x 10 cm)	2694	2518	4297	4196	4.82	4.51
4. 3.33 lakh plants/ha (30 x 10 cm)	2522	2416	3823	3877	4.51	4.33
5. 3.33 lakh plants/ha (20/40 x 10 cm) paird row	2434	2356	3758	3784	4.36	4.21
SE_d	20.3	19.8	30.0	33.2	0.09	0.08
CD	41.5	40.3	61.2	67.7	0.18	0.16

utilization of water along with other resources like light, nutrients, etc.

Applying 4.25 cm of water per irrigation through ridges and furrows increased the yield and WUE. Maintaining the population of 4.0 lakh plants improved the WUE.

REFERENCES

AGASIMANI, C.A. and BABLAD, H.B. (1991). Recent advances in agronomy of groundnut. **J. Oilseeds Res., 8:** 133-158.

AZAM ALI, S.N., GREGORY, P.J. and MONTEITH, J.L. (1984). Effect of planting density on water use and productivity of pearl millet grown on stored water II. Water use, light interception and dry matter production. **Expl. Agric., 20:** 215-224.

KADAM, C.S. and PATEL, B.P. (1992). Effect of irrigation and fertilizer levels on water use pattern in groundnut. (*Arachis Hypogaea* L.) **Fmg. Systems, 8** (3&4) : 59-63.

MICHAEL, A.M. (1978). **Irrigation. Theory and Practice.** Vikas Publishing House Pvt. Ltd., New Delhi.

PATEL, B.P. (1989). Evaluation of broadbeds and furrows (BBF) for irrigated groundnut on medium black soils of Konkan, India. **International Arachis Newsletter 6:** 8-9.

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A COMPARATIVE STUDY OF TRADITIONAL AND NEW ESTABLISHMENT METHODS IN RICE FOR YIELD AND ECONOMICS

D. ESTHER SHEKINAH[1], O.S. KANDASAMY[2], N. BALASUBRAMANIAM[3]
R. JAYAKUMAR and N. PANEERSELVAM[4]

ABSTRACT

Seedling broadcast method of stand establishment with different treatment combinations were studied in rice along with line planting and random planting during *Rabi* 1994-95 and *Kharif* 1995. The rice yield obtained by seedling broadcast planting was comparable with traditional random planting though line planting method produced enhanced yields during both seasons of study. However, the return per rupee invested was highest in the case of rice established by seedling broadcast planting (2.59 and 3.02 in *Rabi* and *Kharif* respectively). Studies on the evaluation of component technologies to enhance yields by seedling broadcast planting method revealed that irrespective of nursery method, 35 day old seedling broadcasted at 30 per cent more plant density produced an yield which was on par with line planting during *Rabi*, while in *Kharif* seedlings of semidry nursery which were 35 days old and broadcasted at normal plant density produced higher yield and higher return per rupee invested.

Rice is grown under different agro-ecosystems. The problems and prospects of rice production in different cultural systems vary greatly. Method of stand establishment is one cultural practice which influences the performance of rice through its effect on growth and development (Mian and Ahsan, 1969 and Nair *et al.*, 1973). The farmer is not able to carry out transplanting at the right time due to scarcity and high cost of labour. To overcome this, the need for development of a new establishment method with less labour utilization and quickness of operation was felt. In South East Asian countries, rice crop establishment by simply throwing the rice seedlings in the puddle has been developed for better management and yield (Matsushima, 1979). Hence, this study was undertaken to compare the three stand establishment methods (line planting, random planting and seedling broadcast planting) in terms of yield and economics and to develop the necessary component technologies for seedling broadcast planting in order to obtain yield and return comparable to the established methods of planting.

MATERIALS AND METHODS

Two field studies were undertaken in Tamil Nadu Agricultural University, Coimbatore during *Rabi* (1994-95) and *Kharif* (1995) to compare the different establishment methods in rice and to

1-Scientist, NBSS & LUP, Amravati Road, Nagpur, 2,3,4-Dept. of Agronomy, TNAU, Coimbatore