AU DOI: 10.15740/HAS/AU/12.TECHSEAR(6)2017/1506-1508 *Agriculture Update*
Volume **12** | TECHSEAR-6 | 2017 | 1506-1508
Visit us : *www.researchjournal.co.in*

RESEARCH ARTICLE :

Influence of *in-situ* moisture conservation practices on productivity of rainfed groundnut

G. RAJITHA, G. PRABHAKARA REDDY, A. MUNEENDRA BBAU AND P. SUDHAKAR

ARTICLE CHRONICLE :
Received :
17.07.2017;
Accepted :
01.08.2017

SUMMARY : A field experiment was conducted during *Kharif*, 2016-17 at Agricultural College Farm, Tirupati to study the effects of *in-situ* moisture conservation techniques on the productivity of rainfed groundnut (*Arachis hypogaea* L.).Broad bed and furrows were effective in conserving the soil moisture leading to improvement in yield attributes and hence, the pod and haulm yields of groundnut. The highest pod yield of 2056 kg ha^{-1} was recorded with broad bed and furrows.

How to cite this article : Rajitha, G., Reddy, G. Prabhakara, Bbau, A. Muneendra and Sudhakar, P. (2017). Influence of *in-situ* moisture conservation practices on productivity of rainfed groundnut. *Agric. Update*, **12**(TECHSEAR-6) : 1506-1508; **DOI: 10.15740/HAS/AU/12.TECHSEAR(6)2017/1506-1508.**

KEY WORDS :
Broad bed, Furrow system, Groundnut, Rainfed, Yield attributes, Yield

Author for correspondence :
G. RAJITHA
Department of Agronomy, S.V. Agricultural College, TIRUPAT (A.P.) INDIA
Email: rajirajitha41@gmail.com
See end of the article for authors' affiliations

BACKGROUND AND OBJECTIVES

Soil moisture is the limiting factor for groundnut (*Arachis hypogaea* L.) productivity under rainfed conditions. Much work has been done and is being directed towards more sustainable measures for conserving soil moisture. Promising and potentially appropriate methods like contour and graded bunds, fallowing and mulching have been developed. Nevertheless, the rate of farmer adoption of these practices remains notably low and is still insufficient for conservation of moisture. This suggests the need for much more simpler methods of moisture conservation with minimum external input and investment. Prolonged drought periods are common, especially during moisture sensitive stages of flowering, pegging and pod development, leading to lower yields. Keeping in view, the importance of groundnut crop, which is predominantly grown during *Kharif* season in Chittoor district of Andhra Pradesh, the present experiment was carried on yield attributes and yield of rainfed groundnut (*Arachis hypogaea*) as influenced by different moisture conservation practices.

RESOURCES AND METHODS

The field experiment was conducted on sandy loam soil (Alfisols) during rainy season at Tirupati. The experimental soil was neutral in reaction (7.5), low in organic carbon (0.38 %) and available nitrogen (149.8 kg ha^{-1}), medium in available phosphorus (11.8 kg ha^{-1}) and available potassium (161.3 kg ha^{-1}). Moisture content at field capacity and permanent wilting point was 14 and 4 %, respectively, with bulk density of 1.5 g cm^{-3}.

There were 8 soil moisture conservation methods. All these were tested in Randomized Block Design, replicated thrice.

Conventional tillage (T_1), vertical tillage with subsoilerupto a depth of 60 cm at an interval of 1.0 m followed by secondary tillage (T_2), deep ploughing with mouldboard plough upto a depth of 40 cm followed by secondary tillage (T_3), conservation furrow after every row (T_4), conservation furrow after every four rows (T_5), broad bed and furrows (90/30 cm) (T_6), straw mulch @ 5 tonnes ha^{-1} (T_7) and soil mulch (frequent intercultivation) (T_8).

Rainfall during the crop period was about 340 mm which was received in 20 rainy days. The crop was subjected to about 30 days moisture stress from August first week to September second week compared with relatively uniform distribution except for about 20 days from August first to third week. In general, rainfall was ideal for growth and development of groundnut. Heavy rainfall from September first week to October, which coincided with reproductive stage of crop had favorable effect on groundnut yield.

Soil moisture at 0 - 30 and 30 - 60 cm soil depth during period of crop growth was measured gravimetrically to assess the influence of these treatments on the productivity of groundnut.

OBSERVATIONS AND ANALYSIS

Soil moisture content during crop period of groundnut was relatively high under vertical tillage with subsoiler (T_2). This was followed by deep ploughing (T_3) and broad bed and furrows (T_6). Conventional tillage (T_1) recorded the least soil moisture content as compared to rest of the treatments.

Conservation furrows after every row (T_4) and every four rows (T_5) may be effective on Vertisols with low infiltration rate and high moisture retentive capacity. When rainfall exceeds infiltration rate of the soil, excess water will be collected in furrows thereby giving more opportunity time for the soil to soak the water. When once the water infiltrated into Vertisol, it will be retained in the soil for long, as it has higher moisture retentive capacity. Therefore, this method was effective on Vertisols. Unless the intensity of rainfall is too high, Alfisol can take almost all the rainfall because of its high infiltration rate. The shallow depth and hence, its low saturation need does not permit storage of water in the soil. Once the soil is saturated there will not be any beneficial effect of water collected in the furrows as it leaves the soil as runoff. Hence, conservation furrow method was not effective on alfisols.

Soil mulch was also not effective in conserving soil moisture. This was due to the fact that there was no difference in moisture conservation treatment between conventional tillage and soil mulch except that soil mulch was done during 20 days interval. Hence, there was no appreciable differences in soil moisture content due to these 2 treatments. In view of the above drawbacks with conservation furrows, soil mulch and conventional tillage methods, vertical tillage with subsoiler, deep ploughing and broad bed and furrow methods of moisture conservation resulted in high soil moisture content all through the crop periods.

Yield components and yield :

Pooled analysis of the data (Table 1) indicated that among different moisture conservation practices, broad bed and furrows resulted in highest number of pegs, total

Table 1: Yield attributes and yield of groundnut as influenced by different moisture conservation practices (pooled data)

Treatments	Number of pegs $plant^{-1}$	Total pods $plant^{-1}$	Filled pods $plant^{-1}$	100 pod weight (g)	100 kernel weight (g)	Shelling (%)	Pod yield (kg ha^{-1})	Haulm yield (kg ha^{-1})
T_1	40.2	22.9	13.9	110.4	41.0	68.5	1436	2501
T_2	53.1	29.2	24.0	123.2	47.6	75.6	1872	3032
T_3	48.6	28.7	22.5	121.8	46.7	74.0	1791	2993
T_4	44.4	28.5	20.8	112.0	44.7	71.9	1691	2798
T_5	44.0	26.9	18.9	112.2	43.9	71.5	1596	2681
T_6	54.1	30.0	25.1	124.0	48.2	76.2	2056	3292
T_7	46.3	27.4	20.8	116.5	46.0	72.6	1712	2856
T_8	42.1	26.0	17.9	110.3	43.8	71.2	1524	2599

and filled pods plant^{-1} which was however on par with vertical tillage with subsoiler, deep ploughing and straw mulch. Relatively low moisture content with conservation furrows, soil mulch and conventional tillage practices resulted in lower number of pegs, total and filled pods plant^{-1}.

The superiority of broad bed and furrows, vertical tillage and deep ploughing over other treatments could be explained on the basis of increased moisture and nutrient availability in altered moisture conservation techniques.This could also be supported by better physical condition of soil, *i.e.*, lower bulk density, enhanced permeability, better aeration and lower penetration resistance making the soil to remain soft and moist due to the *in-situ* water harvesting by reducing runoff losses. Venkateshwarlu and Malaviya (2004) also reported similar findings. The 100 pod weight, 100 kernel weight and shelling percentage also followed similar trend because of adequate available soil moisture with vertical tillage, deep ploughing and broad bed and furrow method of moisture conservation practices. Similar increase in yield attributes with broad bed and furrows were reported by Nimje (1992).

Among different moisture conservation practices, the highest pod yield of 2056 kg ha^{-1} was obtained from broad bed and furrows which was on par with vertical tillage (1872 kg ha^{-1}) and was significantly superior to deep ploughing (1791 kg ha^{-1}) and straw mulch (1712 kg ha^{-1}) while soil mulch and conventional tillage recorded the lowest pod yields. The reduction in pod yields in soil mulch and conventional tillage methods as compared to BBF method was due to lesser number of pegs, total and filled pods plant^{-1}. The poor physical conditions of the soil probably made it difficult for peg penetration and pod development compared to other treatments. The results are in conformity with the findings of Samui and Ambhore (2000) and Hulihalli and Patil (2005).

With respect to haulm yield, the moisture conservation practices differed significantly with one another. Broad bed and furrows recorded the highest yield of haulms followed by vertical tillage, deep ploughing and straw mulch. Haulm yields from conservation furrow after every row and four rows of groundnut were 2798 kg ha^{-1} and 2681 kg ha^{-1}, respectively. The least haulm yield of 2501 kg ha^{-1} was observed in conventional tillage. Such variation in haulm yield could be ascribed due to better soil moisture, good aeration and better soil conditions due to raised nature of the beds under broad bed and furrows. Increase in haulm yield with adequate soil moisture was observed by Venkateshwarlu (2006).

From the results, it is evident that broad bed and furrows, vertical tillage and deep ploughing methods of moisture conservation practices are effective for conserving rain water leading to higher productivity of rainfed groundnut on sandy-loam soil.

Authors' affiliations :

G. PRABHAKARA REDDY, A. MUNEENDRA BBAU AND P. SUDHAKAR, Department of Agronomy, S.V. Agricultural College, TIRUPATI (A.P.) INDIA

REFERENCES

Hulihalli, U.K. and Patil, V.C. (2005). Effect of *in-situ* moisture conservation practices and organic manures on growth and yield of desi cotton (*Gossypium herbaceum*) under rainfed conditions. *Indian J. Agric. Sci.*,**75**(1): 55-57.

Nimje, P.M. (1992). Effect of land treatment systems and phosphorous fertilization on groundnut (*Arachis hypogaea*) in Vertisols. *J. Oilseeds Res*., **9**(2): 227-233.

Samui, R.C. and Ambhore, S.B. (2000). Efficacy of polythene mulch technology in improving growth and yield of post rainy season groundnut in West Bengal, India. *Internat. Arachis News Letter*, **20**: 84-86.

Venkateshwarlu, B. and Malaviya, D.D. (2004). Performance of groundnut as influenced by land configurations and fertilizer management under rainfed conditions of South Saurastra. *Andhra Agric. J.*, **51**(3&4): 292-295.

Venkateshwarlu, B. (2006). Nutrient uptake and quality of groundnut as influenced by moisture conservation practices and fertilizer management.