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Date of sowing and nitrogen levels influenced on phenological effects of irrigated groundnut under climate change

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Abstract

The groundnut (*Arachis hypogaea* L.) crop is subjected to varied climatic conditions and monsoon vagaries on grown under irrigated and rainfed conditions. An experiment was led at Agricultural College and Research Institute, Madurai. Effects on dates of sowing and nitrogen levels influenced on phenology of groundnut (*Arachis hypogaea*) under climate change. Twelve treatment blends with four dates of sowing (D₁: 9th February, D₂: 19th February, D₃:29th February, and D₄:9th March) and three nitrogen levels on (100% RDN, 75% RDN, 125% RDN) in factorial randomized block design was recreated thrice. The results revealed that phenological parameters was significantly higher influenced days to 50% flowering, days to pod initiation and days to maturity recorded early sowing in 9th February and the dose was increased 25% RDN followed by 100% RDN and lowest 75% RDN was observed. It strength be due to well disseminated rainfall received during the cropping period.

Keywords: Groundnut, dates of sowing, nitrogen levels, climate change

Introduction

Groundnut (*Arachis hypogaea* L.) is a leguminous crop having the capability of fixing the atmospheric nitrogen through its root nodules. It is the 13th most important food crop and 4th most important oilseed crop of the world. India ranks first in respect of area, China in production and America in productivity. In India, groundnut is cultivated in an area of 45.9 lakh hectare with the total production of 67.3 lakh tonnes and productivity of 1465 kg ha⁻¹, respectively. Seventy percent of the area and 75 percent of the production is the states of Gujarat, Andhra Pradesh, Tamil Nadu and Karnataka. Gujarat is the largest producer of groundnut contributing 25% of the total production in whole India. Recently decrease in groundnut production in India is due to non-availability of sufficient irrigated water, effect of pest - disease, water logging, drought etc. The multiple uses of crop make it an excellent cash crop for domestic market as well as for foreign trade. It's mainly depends on a number of factors; however, climate plays the most important role. Among the climatic parameter's role of solar radiation, temperature, humidity, rainfall is very crucial.

Materials and methods

The experiment was conducted during *rabi* season-2016 at the at the Agricultural college and research institute, Madurai, department of farm management The experiment was laid out in factorial randomized block design with four dates of sowing (D₁: 9th February, D₂: 19th February, D₃:29th February, and D₄:9th March) and three different doses of nitrogen levels (100% RDN, 75% RDN, 125% RDN) in replicated thrice. The soil type was sandy clay loam in the experiment. The requirement based plant protection measures were followed during the cropping period. More or less crop remain pest and disease free. Periodic plant biometric observations at 30, 60, and 90 days interval of the 5 plants had been recorded from random samples. Based on the observations were on individual plants at ten days interval occurrence of different phenological events viz., days to emergence, flowering, peg formation, pod development, seed initiation days and harvesting days to taken were recorded. The treatments were evaluated on the basis of phenological parameters were converted to per hectare for presenting the results.

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Results

Days to 50% flowering

The phenology of groundnut to increase progressively with advancement of the age of Groundnut. The observation on days to 50% flowering as influenced by different dates of sowing and nitrogen levels were recorded when groundnut repute forwards 50 % flowers. The datas are presented. The days to 50% flowering was higher recorded in D₁:9th February (37) and which was followed by D₂:19th February (33) and D₃:29th February (35). The lower number of days to 50% flowering was recorded the dates of sowing on D₄:9th March (31). The nitrogen levels influenced were lower doses of N levels reduced (25% lesser than the normal) taken lesser days to attain 50% flowering (33). When the N dose was increased, (25% higher than the normal) recorded higher days (35) to taken 50% flowering. The interaction between dates of sowing and N levels with respect to days to 50% flowering was not statistically significant.

Days to pod initiation

The phenology of groundnut to increase progressively with advancement of the age of Groundnut. The observation on days to pod initiation as influenced by different dates of sowing and nitrogen levels were recorded when groundnut repute forwards days to pod initiation. The datas are presented. The days to pod initiation was higher recorded in D₁:9th February (69) and which was followed by D₂:19th February (66) and D₃:29th February (63). The lower number of days to pod initiation was recorded the dates of sowing on D₄:9th March (61). The nitrogen levels influenced were lower doses of N levels reduced (25% lesser than the normal) taken lesser days to attain days to pod initiation (64). When the N dose was increased, (25% higher than the normal) recorded higher days to taken days to pod initiation (66). The interaction between dates of sowing and N levels with respect to days to pod initiation was not statistically significant.

Days to maturity

The phenology of groundnut to increase progressively with advancement of the age of Groundnut. The observation on days to maturity as influenced by different dates of sowing and nitrogen levels were recorded when groundnut repute forwards days to maturity. The datas are presented in Table. The days to maturity was higher recorded in D₁:9th February (106) and which was followed by D₂:19th February (104) and D₃:29th February (102). The lower number of days to maturity was recorded the dates of sowing on D₄:9th March (99). The nitrogen levels influenced were lower doses of N levels reduced (25% lesser than the normal) taken lesser days (64 to attain maturity). When the N dose was increased, (25% higher than the normal) recorded higher days (66) to taken maturity.

The interaction between dates of sowing and N levels with respect to days to maturity was not statistically significant.

Discussion and Conclusion

The days to 50% flowering, pod initiation and maturity taken by the groundnut crop sown at four dates of sowing and three different nitrogen levels on duration of the crop. This result confirm the findings of Bala *et al.*, (2011) ^[1] who reported that delayed sowing delayed 50% flowering in peanut. During the investigation, the observations of the 50% flowering as influenced by different date of sowing treatments. Prathima *et al.*, (2012) ^[2], who found that, 50% flowering reduced due to late sowing conditions and early sowing should be preferred to late one for better development of sink in groundnut. Sahane *et al.*, (1994) ^[3], who concluded that, the lesser days taken for pod initiation and pod development and by longer days to taken for pod initiation and development due to decline of number of leaves, leaf area and leaf area index per plant⁻¹ become of defoliation of leaves and diversion of dry matter towards pod development. Brady and Weil (2002) reported that the variations of the varieties by days to maturity could be attributed to genotypic differences. The shortening of days to maturity by the application of phosphorus as it promotes rapid cell division. Similar that finding were reported that the decline in relative growth rate towards physiological maturity due to leaf shedding, shadow of upper leaves over the lower leaves which reduce the photosynthetic capacity of the lower leaves and finally loss of leaves. Banik *et al.*, (2009) ^[5]. The alternate weather variables, due to different sowing times distorted the yield and yield components significantly except shelling percentage. Many of earlier studies are in line with the present findings which reported that groundnut being a C₃ plant, respond positively to temperature showed enhance in photosynthetic rate, biomass, increased plant height, root length, shoot length, stem length, leaf area and total biomass compared to the CO₂ condition. These results were concluded that solution to improve dates of sowing and different nitrogen levels to enhance the growth and yield to increase crop production and productivity while enhancing growth and yield and protecting environmental quality. The present study shows that dates of sowing and different nitrogen levels were recorded highest growth and phonological parameters D₁:9th February sowing with increased 25% nitrogen was higher than the normal of our indicate the *Rabi* season in the irrigated condition at the southern districts. The days to maturity decreased gradually with the delay in sowings. This may be due to increase in temperature and photo thermal environment encountered by the crop during the growth period. The climate variations due to appropriate sowing time on groundnut crop should be second week of February in southern districts, which will help in obtaining comparatively higher pod yield.

Table 1: Effect of dates of sowing and nitrogen levels on days to 50 % flowering, days to pod initiation, days to maturity in Groundnut VRI 2-2016

Treatments	Dates of sowing (D)		
	Days to 50% flowering	Days to pod initiation	Days to maturity
D ₁ : 9 th Feb	37	69	106
D ₂ : 19 th Feb	35	66	104
D ₃ : 29 th Feb	33	63	102
D ₄ : 9 th Mar	31	61	99
Nitrogen levels (N)			
N ₁ : Normal (100%)	34	65	103
N ₂ : Lesser than normal (-25%)	33	64	102
N ₃ : Higher than normal (+25%)	35	66	104
SEd (D)	0.33	0.75	1.59
CD (0.05) (D)	0.68	1.56	3.29
SEd(N)	0.28	0.65	NS
CD (0.05) (N)	0.59	1.35	
SEd(DxN)	NS	NS	NS
CD (0.05) (DXN)			

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