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Crop Calender For Groundnut Farming In The Drought Prone Anantapur District, Andhra Pradesh

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Abstract

The present research paper attempts to provide scientific information on crop calendar for sustainable groundnut crop farming in Anantapur district, Andhra Pradesh. Anantapur district is known for frequent occurrences of drought and prolonged dry spells which have had a debilitating and devastating effect on crop economy of the district. Anantapur district is the largest producer of groundnut and has maximum hectarage in Andhra Pradesh. The practices and performances of ground cultivation heavily depend upon the behaviour of the monsoons, hence, the productivity of the crop is subjected to wide fluctuations of rainfall and in turn affecting its economy and the fate of the farmers. To evolve a suitable crop planning, the crop calendar is prepared based on the water availability and water requirement for groundnut crop with the help of modified Penman method. For this, weekly rainfall data for a long period i.e., 60 years is used and applied Penman formula with the help of computer programme and derived crop calendar for groundnut cultivation in Anantapur district.

Introduction

Information about probable timing for different stages crop growing based on the minimum amount of rainfall that is to be expected is very useful for crop planning under rainfed conditions particularly in the arid and semi-arid regions. At present lot of research is taking place on "the crop selection" and preparation of crop calendar in order to bring awareness among farmers on crop selection with scheduled crop sowing and harvesting periods.

In drought prone areas like Anantapur District, Andhra Pradesh, rainfall is the major climatic element that determines the crop growth and its yield as well as gross production. In this district, groundnut is the monoculture crop accounts for about 70 per cent of the cropland and mostly cultivates under rainfed conditions.

Hence, an understanding of the characteristic features of rainfall distribution in relation to the growth stages of the groundnut crop and soil conditions are essential for successful crop planning and management. Simple criteria related to sequential phenomena as dry and wet spells can be used to obtain specific information needed for crop planning. Morries and Zandstra (1978) suggested that "the 75 mm rainfall in the beginning of the rainy season and the date of cessation of the rainy season can be determined by backward accumulation of rainfall from the end of the rainy season".

Study Region

The present study region, Anantapur district is the most chronically drought prone area of Andhra Pradesh State and is the second

lowest rainfall area of the country next to Jaisalmer of Rajasthan. Anantapur is the largest district in terms of geographical area in the State and overwhelmingly depends upon agriculture for its economy. The district has vast agricultural land resource accounting for about 65 per cent of its total geographical area. About 70 per cent of crop land in the district is found under groundnut cultivation. It is truism that groundnut is the monocrop in the district and largely cultivates under rainfed conditions. Hence, the groundnut production is subjected to wide fluctuations of rainfall resulting into low crop productivity and sometimes the failure of the crop and thus affecting the economy of the district and the fate of the farmers alike. It is indeed from the above facts that the present research paper attempts to provide scientific information on crop calendar for sustainable groundnut farming in the district.

Methodology

To assess the probability of getting adequate rains subsequently for crop establishment, the probability of occurrence of wet weeks is essential. Ferere (1986), indicated an analysis of rainfall based on decades (period of 10 days) dividing each month into 3 decades. The Indian meteorological department suggest standard weeks (a period of seven days) dividing the year into 52 standard weeks. Food and Agricultural Organisation suggested 4 methods for computing the crop water requirement namely (i) Radiation method, (ii) Blancy and Creddle method, (iii) Open Pan method and (iv) Modified Penman method. In the present study, the modified Penman formula is applied with the help of computer programme. Weekly rainfall data for a long-period i.e., 60 years is used for the preparation of crop calendar for groundnut farming in Anantapur district.

The amount of rainfall that is received before, during and after the growing season also varied widely. The mean rainfall received during the season is 380 mm and their mean rainfall before the start is 115 mm and after 70 mm in Anantapur district.

It is also calculated that the amount of rainfall that was received during the growing season as the percentage of the total annual rainfall for each individual year. The mean seasonal rainfall is 66 per cent of the annual total rainfall. It is the highest (93%) during 1965 and the lowest (24%) during 1982. The number of years which received rainfall lower than the mean (66%) were 33 years, among them during three years it was less than even 50 per cent of the mean.

Groundnut Crop Planning for Anantapur District

Morris and Zandstra (1978) suggested that the rainfed crops can be sown when the rainfall accumulates to 75 mm and it is the beginning of the rainy season. Accordingly the standard weeks of sowing and cessation of rainy season were worked out rain-gauge station-wise and analysed. Altogether, there were eleven rain-gauge stations in the district.

It is evidently found that one rain-gauge station, namely, Hindupur has the sowing season starting from 15th May and two rain-gauge stations, namely, Penukonda and Kadiri have the sowing season starting from 25th May. In the case of 4 rain-gauge stations, namely, Anantapur, Dharmavaram, Gooty and Kalyandurg have the sowing season starting from 4th June. Anantapur

district as a whole has the sowing season starting from 28th May onwards. According to this planning, the groundnut crop has to face acute drought during the stage-2 and stage-3 which is having a shattering effect on groundnut pod growth and resulting into poor yield levels or at the worst crop failure. Therefore according to the 10mm rainfall probability, water availability and groundnut crop water requirement models are developed for the 11 rain-gauge stations of Anantapur district.

As per reports of Andhra Pradesh Agricultural University Dryland Research Station, Anantapur, it is suggested that 1st week of July is available for the sowing of groundnut in Anantapur. On the basis of this suggestion different models have been worked out for different areas of the district about the right sowing and harvesting of groundnut by superimposing the weekly water availability and water requirement for groundnut crop.

Model-I: Crop Calendar for Groundnut Farming

In this model only one station namely, Madakasira is categorized based on the starting of groundnut crop sowing from 25th June onwards and harvest from 24th September onwards. For Madakasira, it is suggested that groundnut crop planning has the 50% of 10 mm probability throughout the crop period with maximum of 70% during the peak water required period (Stage-5) of the groundnut phenophase i.e., pod insulation to maturity. This model is developed to have a sufficient amount of wetness (10m rainfall) probability during stage-5 in order to yield good harvesting results instead of taking early sowing during 28 May – 3 June and late harvesting resulting into poor yield levels and water loss and often damage of the crop at harvesting stage. Even at the time of sowing there is an accumulated 18% of rainfall of rainy season, which would also help to sustain any successive drought weeks during the stage-2 (Emergence to 50% Blooming).

14 May-14 June	Pre sowing operations
25 June-1 July	Stage-I Sowing to Emergence
2 July-22 July	Stage-2 Emergence to 50% Blooming
23 July-5 Aug.	Stage-3 50% Blooming to Pegging
6 Aug.-26 Aug.	Stage-4 Pegging to Pod initiating
27 Aug.-30 Sept.	Stage-5 Pod initiation to Maturity
1 Oct.-4 Nov.	Late Harvesting operations

Model-II: Crop Calendar for Groundnut Farming

In this model-2, stations namely, Uravakonda and Rayadurg are categorized based on groundnut sowing from 2nd July onwards and harvesting from 1st October onwards. For Uravakonda and Rayadurg, it is suggested that the groundnut crop planning has the 40% of 10mm rainfall probability throughout the crop period except 3 weeks (3-9 September and 17-30 September) with below 40 per cent. The maximum of 60 per cent of 10 mm rainfall probability is observed during 23-29 July which is favourable for stage-3 of groundnut crop growing. At the time of sowing groundnut crop there is an accumulated 20% of rainfall of rainy season which is sufficient for pre-sowing

operations. During the harvest time there is still 10% of the rainfall remaining which will certainly help even late harvesting or help easy harvesting operations.

14 May-1 July	Pre-sowing operations
2 July-8 July	Stage 2 Emergence to 50% Blooming
30 July-12 Aug.	Stage 3 50% Blooming to Pegging
19 Aug.-2 Sept.	Stage 4 Pegging to Pod initiation
9 Sept. -7 Oct.	Stage 5 Pod initiation to Maturity
8 Oct.-4 Nov.	Late Harvest operations

Model-III: Crop Calendar for Groundnut Farming

In this model 4 stations namely, Penukonda, Gooty, Kadiri and Kalyandurg are categorized based on groundnut crop sowing from 9th July onwards and harvesting from 8th October onwards. For Penukonda and Kalyandurg, it is suggested that the groundnut crop planning has 45% of 10 mm probability throughout the crop season except three consecutive weeks namely, during 27 August – 16 September having only 35% of 10 mm probability. The maximum probability of 65 per cent of 10 mm rainfall is found during the time of stage-2 and another peak probability of 65 per cent is found during the time of stage-5. A probable dry spell during stage-4 may not cause much problems for groundnut crop success.

Availability of 2 peaks of rainfall probability of more than 50% is best suited model in which first peak rainfall probability is suggested for stage-2 and another peak rainfall probability is suggested for stage-5 which are essential and crucial stages. At the time of sowing an accumulated 25 per cent of rainfall of the season is an ideal conditions for pre-sowing operations. For Gooty and Kadiri the 50 per cent of 10 mm rainfall occur throughout the crop cultivation period. The 2 peaks more than 70 per cent of 10 mm rainfall probability assure the crop success. The first peak of 75 per cent of 10 mm rainfall probability is observed during the stage-2 and the second peak of 70 per cent of 10 mm rainfall probability is observed during the stage-5 of groundnut crop season which are the most advantageous peaks of rainfall probability than any other stations in the district accumulated rainfall of the season helps to pre-sowing operations.

14 May-15 July	Pre sowing operations
9 July-15 July	Stage I sowing to Emergence
16 July-5 Aug.	Stage 2 Emergence to 50% Blooming
6 Aug.-19 Aug.	Stage 3 50% Blooming to pegging
20 Aug.-9 Sept.	Stage 4 Pegging to pod initiation
10 Sept.-14 Oct.	Stage 5 Pod initiation to Maturity
8 Oct.-21 Oct.	Late Harvest Operations

Model-IV: Crop Calendar for Groundnut Farming

In this model 4 stations namely Anantapur, Dharmavaram, Hindupur and Tadipatri are classified based on groundnut TMV2 variety crop sowing from 16th July onwards and harvesting from 15th October onwards. For Anantapur and Dharmavaram and Hindupur it is suggested the groundnut crop planning has only 35 per cent 10 mm rainfall

probability is found through the season probability. The maximum probability of 65 per cent of 10 mm rainfall is found during the stage-5 which would at least help good yield and easy harvesting operations. At the time of groundnut crop sowing there is an accumulated 25% of rainfall of the season is available which will to helpful for pre-sowing operations. For Tadipatri only 30 per cent of 10 mm probability of rainfall is available throughout the crop season. The 50 per cent of 10 mm rainfall could be occurred during the stage-5 which is a good sign for assured harvest. The initial low probability may not effect the sowing stage because of an accumulated 25 per cent of rainfall of the season is available at the time of sowing.

The period between 14th May and 15th July would help the pre-sowing operations and take of the risk of drought occurrence during the early stages of groundnut crop. The late harvesting can also be taken place during 22 October – 4 November due to sufficient availability of rainfall probability.

14 May-15 July	Pre-sowing operations
16 July -22 July	Stage-1 Sowing to Emergence
23 July-12 Aug.	Stage-2 Emergence to 50% Blooming
13 Aug. -26 Aug.	Stage-3 50% Blooming to pegging
27 Aug.-16 Sept.	Stage-4 Pegging to Pod Initiation
27 Aug. -21 Oct.	Stage-5 Pod Initiation to Maturity
22 Oct.-4 Nov.	Harvest operations

Conclusion

From the above suggested models, it is found that for Anantapur district as a whole, the sowing operations can be taken place during 16-22 July which has the 25 per cent accumulated rainfall of the season before sowing stage. During the stage-1 invariably low per cent of 10 mm rainfall probability is found.

During the stage-5, it is also recorded there is high per cent of 10 mm rainfall probability. Therefore it is suggested that groundnut crop can be cultivated between 16th July and 21st October. The above suggested models help to resolve the unscientific and unplanned nature of groundnut crop operations in the risks of erratic behavior of monsoonal rainfall patterns in different areas of the district.

Based on the present analysis it is found that the sowing can be done when the 25% of accumulated rainfall of the rainy season is occurred. By and large it is found during 16-22 July and it is the suitable standard week to start the sowing of the groundnut crop in Anantapur district. The crop calendar prepared based on scientific results clearly indicated the appropriate periods of sowing, emergence, blooming, begging, podding and maturity. This will certainly help the farming community of different parts of Anantapur district for scientific and successful cultivation of groundnut at higher probability.

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