

Determination of planting Season of Sugarcane at Kuraz Sugar Development project, Southern Ethiopia

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Abstract

The timing of planting, ratooning and harvesting influences the productivity of a sugarcane crop cycle. It is necessary to quantify these effects, both within and outside the current harvest season, to optimize crop cycle productivity and to optimize harvest season length. The effect of different planting times was examined in area depending on the weather condition of the study area. The results obtained show that there were high consecutive rainfall in the month of March, April, May as compared with other months of the area. There is also high rain on the month of September, October and November, which shows the consecutive existence of rainfall show the planting season should be out of this time. However, in the latter consecutive months there were dates receiving no rainfall, which indicate planting, are possible within this time. From this all it is concluded that the planting season of kuraz sugar plantation project were ranged from June to December.

Key words: Sugarcane, planting time, Rainfall, Temperature.

1. Introduction

Kuraz sugar development is one of the largest new sugar project established by Federal Democratic Republic of Ethiopian Sugar Corporation. The project will be planned to establish on 175000 ha's of land and five factories will be built in the project site with maximum cane crushing capacity of 84000tones per day. Omo river is the source of irrigation water for sugar cane production but sugar cane production is affected by many factors; one of which is planting season.

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Sugar cane is tropical by origin and all cultivation is in warm countries but it is adapted to arrange of tropical climate and it is grown from 37° N Spain to 31° S in the Republic of South Africa. It cannot tolerate freezing temperatures and growth essentially cease at mean minimum temperature below about 12° c. Nevertheless, sugar cane is grown under wide range of temperature, solar radiation, and rainfall [3]. The ideal environment for sugar cane is grown in which rain fall/irrigation is well distributed during growing season but where pre harvest ripening period is relatively dry, and the sunshine hours are plentiful throughout the whole season Bakker M in1999.

According to [2], a total rain fall between 1100 to 1500mm is adequate provided when the distribution is right, abundant in the month of vegetative growth followed by a dry period for ripening while, optimum temperature for sprouting of stem cuttings is 23 ° c to 38 °c. sugar cane is grown under divers agro climatic conditions in the world. Therefore, there is a considerable variation in the planting dates and the optimum planting periods in different countries [2]. In those parts of tropical Africa that have year round rain fall, planting can be done at any time but where there is a dry season between two rains, planting should be done well ahead of the dry season so that the plant cane with stand a period of drought. At Wonji; December to February planting give maximum cane yield than March and April planted cane. At Metahara sugar factory the planting season is from November to May [4]. As the project site is new area developed for sugar cane production, there was no any recommended planting season like to other sugar production factories. Therefore, this paper try to integrate average rain fall data, soil temperature and maximum and minimum air temperature used to determine tentative planting season of sugar cane crop at kuraz sugar plantation.

2. Materials and Methods

2.1 Description of study area

Kuraz Sugar Development Project is located between 5° 8' 18" – 6° 16' 59" latitude and 35° 43' 37" – 36° 13' 54" longitude and its elevation ranges from 370 – 500 masl. It is found in South Omo Zone in the plain areas of the lower Omo basin of the Southern Nations Nationalities of People's [5].

2.2 Methodology

Rainfall data, soil and air temperature data were collected from kuraz meteorology station starting from June 2012 up to Febrarury, 2015 to determine planting season of sugar cane at kuraz. Those parameters such as average rain fall, air temperature and soil temperature was calculated accordingly to determine planting season. Besides, moulding time also considered in order to much planting time. Finally, data collected were analyzed by spreadsheet and explained descriptively.

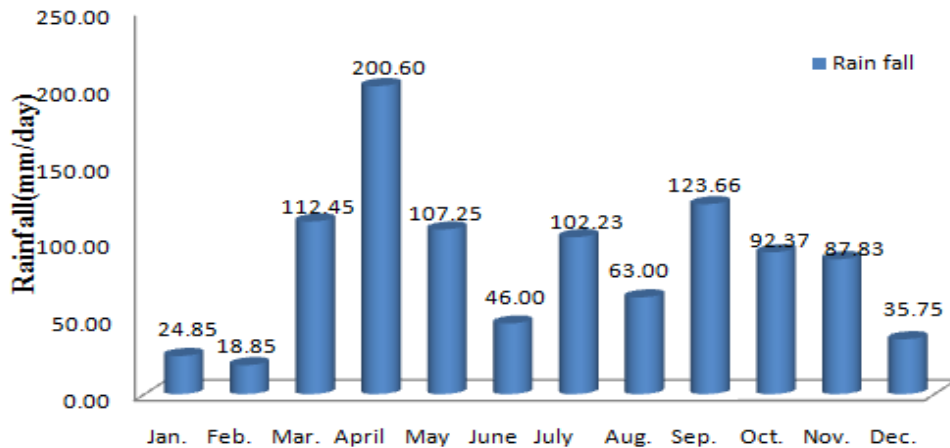
3. Results and Discussion

3.1 Rain fall of study area

The meteorological data was collected from kuraz meteorological station starting from June, 2012 up to Febrarury, 2015. According to meteorological data recorded; the annual rain fall of study area is 1014.84 mm but the rain distribution of study area is not even. It varies from one plantation site to another plantation site in the same site of study area. Due to this, moulding, planting and land preparation activities was highly affected. Relatively the consecutive highest rain fall was recorded in the month of March, April and May which is 112.45mm, 200.6 mm and 107.25 mm respectively. The average rain fall of the study area from June, 2012 to Febrarury, 2015 is given as Figure1

Table 1: Descriptions of average meteorological data's .

S/NO	Meteorological parameters	Description	Months											
			Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov	Dec.
1	Air temperature	Max.	39	39	38	37	33	33	32	33	33	34	34	36
		Min.	20	21	22	23	21	20.7	20.5	20.7	20.7	20	19.7	18.5
2	Rain fall	mm	24	19	112*	215*	107*	50.6	124	57	162.7	75	109	31.8
3	Soil temperature	At 0.05m												
		depth	37	34	35	34	33	30.7	30.0	31.4	30.9	31	31.1	32.8
		At depth 0.1m	32	31	33	33	31	29.4	28.5	30.0	29.7	30	30.0	31.1



Source: Kuraz Metrology Station, 2015

Sugar cane is grown in wide range of rain fall varies from 600-3000mm and it can grow successfully with a uniform rainfall distribution of 1200mm. In areas with scanty and poorly distributed rainfall, irrigation crop is raised [3]. According to [3], Rainfall pattern dictates planting.

3.2 Temperature

The optimum temperature for growth is between 24-32°C however, ambient temperatures above 38°C reduces photosynthesis with increased respiration [3]. According to the metrological data of the area, the temperature was laid between the optimum ranges.

Optimum temperature for sprouting of stem cutting is 32 to 38°C and growth is closely related to temperature. The soil temperature greater than 21°C and the air temperature b/n 32-38°C is the best for planting cane crop. The average maximum and minimum air temperature of study area is 35°C and 21°C respectively and the soil temperature at depth of 0.05m and 0.1m is 33°C and 31°C respectively but in the months of January and February soil temperature and air temperature is highest (Source: Kuraz metrological station). From this aspect for proper germination of seed cane setts pre-irrigation of soil is a good approach for regulating the soil moisture of the area. Even though, study area has more rainy months soil and air temperature is applicable for planting. The soil and air temperature data is given in the following Figure 2.

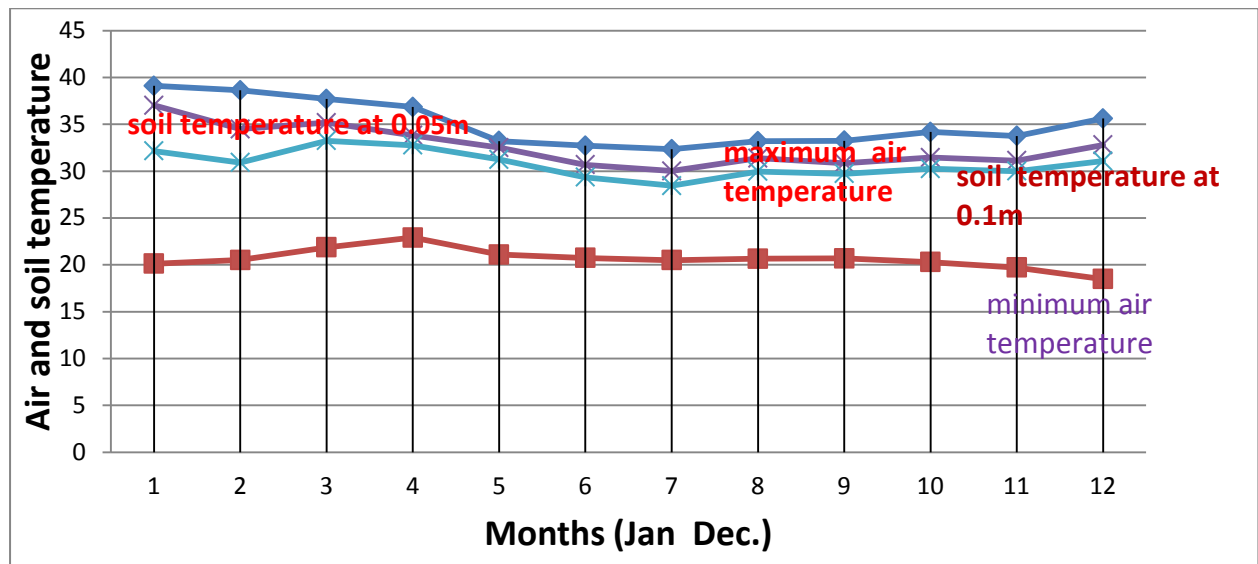


Figure 2: Graph of soil and air temperature (Source: Kuraz metrology station)

3.3 Planting

The time of planting in the year has a significant importance on the yield achieved in the plant cane crop. In general, the earlier in the planting period it can be done, the higher the yield will be. This is because of the emerged cane has a longer growth period and is better to attain full tillering and leaf canopy, before the commencement of rapid stalk elongation with the onset of warmer conditions [2]. The characteristic of rain fall in the area was variable, therefore it is better for the plantation to plant cane at earlier in the planting period in order to much with moulding time.

According to [2], irrigation farmers have much more control of their planting program than do producers of rain fed cane. The latter have to delay their planting until the onset of the rains and often have to rush to complete

before high rainfall and wet soil conditions prevent any further planting. Even though, they have to accept that some planting may be failures because of only intermittent or light rainfall is received.

Provided land preparation is complete and sufficient, equipment and labor are available, planting can be successful which is currently on going in the study area, especially, as in many tropical countries, the timing of the onset of the wet season can be predicted with reasonable accuracy and heavy showers often precede its arrival [1]. Planting operation primarily affected by rainfall intervention, which hinders machinery movement in the field during land preparation; since the soils of kuraz have vertic character in which the 6mm/day rainfall can restrict all land traffic this study is in agreement with [7]. Another characteristic of the area is soil temperature, which affects sprouting. For sugar cane germination ideal soil temperature of 23-28°C is required. However, low temperature between 8-18°C delay the germination (30-45 days) and temperature below 5°C is injurious to buds. With logic, ideal planting time of Kuraz is June to February [4].

According to meteorological data of study area; the highest successive rainfall was recorded in the month of March, April and May and the highest temperature was recorded in months of January, February, March and April (Figure 1). Due to planting operation is primarily affected by rain fall interference and it hinders machinery movement in the field for land preparation and cultivation as well as the moulding; the planting of cane in the study area should be done out of moulding time in highest consecutive rainy months. With this logic, ideal planting of sugar cane in kuraz sugar development project will be June to December.

4. Conclusion and Recommendation

To determine planting season of the project average rainfall, maximum and minimum air and soil temperature at 0.05m and 0.1m used. Based on meteorological data collected consecutive highest rainfall was recorded in the months of March, April and May. However, at month of September, high rainfall was also recorded but the distribution of rainfall was not successive in the next months.

Based on this the following recommendations are suggested to determine planting season.

- Planting season for kuraz expected to be June to December
- Due to planting operation primarily affected by rainfall and it hinders machinery movement during land preparation and cultivation; the activities should perform before onset of rainfall.
- In the kuraz condition, it is possible to plant at condition available with considering land preparation activity.
- Further studies should be carried out to determine planting season by collecting long year's meteorological data of the study area.

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