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Effect of tree density and different fertilizer levels on flowering and yield parameters of cashew (*Anacardium occidentale* L.) under coastal sandy soils of Andhra Pradesh

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Abstract

An experiment was conducted during the year 2001 to 2014 at Cashew Research Station, Bapatla situated in southern coastal region of Andhra Pradesh. The experiment comprising of nine treatments with a objective to study the response of vegetatively propagated material of cashew to different doses of NPK fertilizers at different spacings with a variety BPP-8, developed at All India Coordinate Research Project on Cashew, Bapatla, Andhra Pradesh.

The results of the study revealed that among the treatments flowering duration was found lowest in the treatment S2M3 (96.7 days) followed by the treatment S3M1 (96.8 days) and highest flowering duration was recorded with the treatment S1M1 (104.0 days). Maximum number of mean flowering laterals per m² was recorded in the treatment S2M3 (26.38) followed by the treatment S2M1 (26.31). Lowest number of flowering laterals per m² was recorded in the treatment S3M3 (20.79). The maximum sex ratio (Male to Hermaphrodite flowers) was recorded in the treatment S2M1 is 0.148 followed by the treatment S1M3 (0.140). The lowest was recorded in S1M2 (0.096).

The mean number of nut per m² was found highest in S1M2 (28.01) and followed by the treatment S2M2 (26.18). The lowest number of nuts per m² was recorded with S1M1 (20.26). The maximum mean number of nuts/panicle was recorded with the treatment S1M2 (3.82) followed by the treatment S1M3 (3.51) and minimum was recorded in the treatment S1M1 (2.63). The mean nut weight was highest in the treatment S1M2 (7.56g) followed by S2M2 (7.13g) and lowest was recorded in the treatment S2M3 (6.93g). Mean apple weight was found highest in the treatment S3M1 (57.52g) followed by the treatment S2M2 (57.00g) and minimum was recorded with the treatment S3M2 (51.77g). The average nut yield per tree was highest with the treatment S1M1 is 7.73kg/tree followed by S1M2 (7.01kg/tree). The lowest yield was recorded with the treatment S2M3 i.e. 4.75kg/tree.

Keywords: Tree density, fertilizer, parameters, *Anacardium occidentale* L.

Introduction

Cashew (*Anacardium occidentale* L.) a member of the family Anacardiaceae with natural order Sapindales, is an evergreen tree. It is a native of tropical central and South America (Paul, 1936)^[3]; but is now distributed all over the tropics and part of warm subtropics (Conrad, 1994). However, colder subtropical areas are not suitable for cashew due to cold and frost; although the tree may grow and even bear a few flowers. However, very little efforts have been made to collect historical evidence of the cashew cultivation except the first illustrative description of cashew was given by French naturalist, Thevet in 1558 AD. The country of origin is north Brazil from where it has been thoroughly dispersed throughout the tropical low land of Mexico and West Indies. It was introduced into Africa and India by Portuguese travellers in the 15th and 16th centuries (De Costa, 1578). Cashew is one of the important plantation crop cultivated in an area of 9.82 lakh hectares with an annual nut production of 7.28 lakh tons with an average productivity of 772kg/ha in India and in Andhra Pradesh it is cultivated in an area of 1.83 lakh hectares with an annual production of 1.18 lakh tons with an average productivity of 646kg/ha (DCCD, 2013). An experiment was conducted to study the performance of vegetatively propagated material of cashew to different doses of NPK fertilizers at different spacings with a variety BPP-8 under All India coordinated Research project center of Andhra Pradesh. The low productivity and low yield potential of different existing varieties that are developed in the state accordingly the improvement of the crop through proper spacing and optimum fertilizer doses of new clones and their evaluation has been taken up since 2001 at Cashew Research Station, Bapatla, Guntur District, Andhra

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Pradesh with this objective the trial has been taken up and evaluated for the last fourteen years. The observations on different flowering parameters, nut character and yield parameters were recorded and discussed in the present study. Effect of tree density and different levels of fertilizers levels on flowering and yield parameters of cashew (*Anacardium Occidentale*. L) under coastal sandy soils of Andhra Pradesh.

Materials and Methods

A field experiment was conducted for 13 years of Cashew Research Station Bapatla Guntur District Andhra Pradesh of Dr. YSR Horticultural University Andhra Pradesh from 2001-2014. The experimental plot located in a typical sandy soil conditions which is eight kilometer away from the sea coast and lies between 15°54'943 North latitude and 80°29'029 East longitude. The experiment was laid out in split plot design with four replications for each treatment. The experiment comprising of nine treatments includes three levels of spacing S1 (10x5m), S2 (6x4m) & S3 (5x4m) and fertilizer level M1 (75kg N, 25kg P2O5, 25kg K2O), M2 (150kg N, 50kg P2O5, 50kg K2O) and M3 (225kg N, 75kgP2O5 75kg K2O) as treatments replicated each treatment in four rows with each row comprising ten plants. The clonal plants were planted in the year 2001 and were maintained in each treatmental plot at Cashew Research Station, Bapatla. The observations recorded were like flowering duration (days), mean no of flowering laterals/m², sex ratio (Male to Hermaphrodite flowers), mean no of nuts/.m², mean number of nuts/panicle, mean nut weight, average nut yield/tree and cumulative nut yield/tree for seven harvests. The experimental data were subjected to statistical analysis and procedure laid out by Panse and Sukat me (1985).

Results and Discussion

The performance of cashew clones planted at different spacings with different levels of fertilizers for their flowering, yield and nut parameter were presented in the table.

1. Flowering parameter: The data showed significant differences among the different treatments for their flowering characters. The result of the investigation have shown that the treatments S2M3 has recorded the lowest number of flowering duration (96.7 days). Which was followed by the treatment S3M1 (96.8 days) and the highest number flowering duration was recorded with the treatment S1M1 (104.0 days). Regarding mean numbers of flowering laterals/m² the highest number was recorded with the treatment S2M3 (26.38) followed by S2M1 (26.31) and the lowest number of flowering laterals were recorded with the treatment S3M3 (20.79) which reveals that, the higher spacings showed maximum number of flowering laterals compared to close spacings. The sex ratio i.e. Male hermaphrodite to flowering ratio was registered with the maximum in the treatment S2M1 (0.148) followed by the treatment S1M3 (0.140) and the lowest was registered with the treatment.

2. Nut Character: The data showed significant differences among the treatments for their nut characters. The results of the investigation have shown that the treatment S1M2 has recorded the maximum number of nuts per square meter (28.01) and followed by S2M2 (26.18) the lowest numbers of nuts were recorded with the treatment S1M1 (20.26). Which indicates that optimum doses of fertilizers will influencing the mean number of nuts/m². The maximum number of

nuts/panicle was found highest with the treatment S2M2 (3.82) followed by the treatment S1M3 (3.51) and lowest was recorded in the treatment S1M1 (2.63) and indicates that optimum doses of fertilizers influences the number of nuts per panicle. The mean nut weight was found to be highest with the treatment S1M2 (7.56g) followed by S2M2 (7.13g) and the lowest was found in the treatment S1M3 (6.89 g). The mean apple weight was found highest with the treatment S3M1 (57.52g) followed by the treatment S2M2 (57.0 g) and lowest was recorded with the treatment S3M2 (51.77 g) which reveals that, fertilizer doses & spacing levels influences the apple weights.

Yield parameters

The highest average nut yield for seven years was found highest with the treatment S1M2 (7.73kg/tree) followed by the treatment S1M1 (7.01) and lowest was registered with the treatment S3M3 (4.98kg/tree), indicate that the yield is proportional to the mean number of nuts/panicle and mean number of nuts per m². The cumulative nut yield was found highest with the treatment S1M2 (51.78kg/tree) and followed by S1M1 (51.36kg/tree) and lowest cumulative nut yield was recorded with the treatment S2M3 (30.89kg/tree) for seven consecutive years. Which reveals that optimum does of fertilizers with wider spacing i.e. in S1M2 (spacing of 10x5 m and fertilizer levels 150kg N, 50kg, P2O5 & 50kg K2O) has enhance the production.

Conclusion

In the present investigation under present agro climate conditions of Bapatla, the treatment S1M2 has shown significantly highest mean number of nuts/M², (28.01) mean number of nuts/panicle, mean nut weight (g) (7.56g), Average nut yield per tree (7.73kg/tree) and cumulative nut yield/tree (51.78) for seven harvests, which compared to the treatments, indicated that optimum doses of fertilizers and spacings influences the yield.

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