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Vinu KS

Department of Agricultural
Meteorology, College of
Agriculture Kerala Agricultural
University, Vellanikkara,
Kerala, India

Ajithkumar B

Department of Agricultural
Meteorology, College of
Agriculture Kerala Agricultural
University, Vellanikkara,
Kerala, India

Harithalekshmi V

Department of Agricultural
Meteorology, College of
Agriculture Kerala Agricultural
University, Vellanikkara,
Kerala, India

Aswathi KP

Department of Agricultural
Meteorology, College of
Agriculture Kerala Agricultural
University, Vellanikkara,
Kerala, India

Influence of weather parameters on the growth and yield of cowpea in central zone of Kerala

Vinu KS, Ajithkumar B, Arjun Vysak, Harithalekshmi V and Aswathi KP

Abstract

The Field experiment was conducted during the period, 2018 November to 2019 March. The experiment was laid out in split plot design, the main plot treatment was taken as date of planting. There were three dates of planting 5th November, 25th November and 15th December. The subplot treatment were two different varieties *i.e.* *Anaswara* and *Kanakamony*, both are semi trailing varieties. Plant height was monitored every 15 days interval. Total yield of each date of planting was recorded and ANOVA was carried out. From the analysis it was found out that *Anaswara* showed highest height after 15 days, later in the 30th, 45th, and 60 days the highest height was observed in *Kanakamony*. A considerable yield fluctuation was observed between each date of planting. During the first date of planting both the varieties showed a good yield, during second and third date of planting yield was found to be reduced. The *Anaswara* variety showed higher yield compared to *Kanakamony*. Correlation studies were conducted between performance of a variety and different weather parameter. From the correlation studies it was understood that maximum temperature, wind speed, and evaporation shows a significant negative correlation and minimum temperature, forenoon relative humidity and after noon relative humidity and bright sunshine hour showed a significant positive correlation with yield in the variety *Anaswara*. In the case of variety *Kanakamony*, maximum temperature, wind speed, bright sunshine hour and evaporation showed a significant negative correlation and minimum temperature, forenoon relative humidity, afternoon relative humidity and rainfall showed a significant positive correlation with yield.

Keywords: dates of planting, cowpea, maximum temperature, minimum temperature, wind speed, bright sunshine hour, evaporation, forenoon relative humidity, afternoon relative humidity and rainfall

1. Introduction

Cowpea (*Vigna unguiculata* (L.) Walp) is a major grain legume. It is also called as vegetable meat due to high amount of protein in grain. The cowpea is grown worldwide with an estimated cultivation area of about 12 to 14 million hectares annually and an annual worldwide production of over 4.5 million metric tons. India is one of the major countries contributing cowpea production in the World. It is grown for its green pods, dry seeds and forage which are used for food and feed. Weather variables like temperature and rainfall were the most important factors, which affect the growth, productivity and adaptability of crops (Wallies *et al.*, 1980) [3]

2. Materials and Methods**2.1 Field experiment**

The field experiments were conducted at Instructional Farm, Kerala Agricultural University, Vellanikkara (10.54°N, lat. and 76.27°E, long. at an elevation of 22 m) by adopting split plot design. The main plot treatment was taken as dates of planting. Spacing adopted was 30 cm × 15 cm. Recommended dose of fertilizers (20 N, 30 P₂O₅, 10 K₂O kg ha⁻¹) were applied to the crop as basal. There were three dates of planting, 5th November, 25th November and 15th December. The subplot treatment was two different varieties *i.e.* *Anaswara* and *Kanakamony*, both are semi trailing varieties. All the management practices were done according to the package of practices recommendations by Kerala Agricultural University (2015). Plant height was monitored at every 15 days interval. Weather data for the experimental period were recorded at Principal agromet observatory, Department of Agricultural Meteorology, Kerala Agricultural University.

2.2 Statistical analysis

Correlation studies were conducted between performance of a variety and different weather parameter. Analysis of variance was done for plant height and yield.

Corresponding Author:**Vinu KS**

Department of Agricultural
Meteorology, College of
Agriculture Kerala Agricultural
University, Vellanikkara,
Kerala, India

3. Results and Discussion

Variety *Anaswara* showed highest height after 15 days, later in the 30th, 45th, and 60 days after sowing (Fig.1.) in *Kanakamony*. A considerable yield fluctuation was observed between each dates of planting. The *Anaswara* variety showed higher yield (Fig.2.) compared to *Kanakamony*. During the first date of planting both the varieties showed a good yield, during second and third dates of planting yield was found to be reduced. This result showed similarity with the findings of Dudi *et al.* (2009) [2]. Correlation studies were conducted between performance of a variety and different weather parameter. Correlation studies were conducted between performance of a variety and different weather parameter (Table 1 &2). In case of variety *Kanakamony*, maximum temperature, wind speed, bright sunshine hour and

evaporation showed a significant negative correlation and minimum temperature, forenoon relative humidity, afternoon relative humidity and rainfall showed a significant positive correlation with yield. The correlation studies showed that maximum temperature, wind speed and evaporation have significant negative correlation and minimum temperature, forenoon relative humidity, after noon relative humidity and bright sunshine hours have significant positive correlation with yield for the variety *Anaswara*. According to Agele, *et al.* (2013) [1], the alternating drought situations of the early rainy and late seasons affected plant biomass, leaf production, flowering, pod and seed yield characters in the cowpea cultivars. The minimum temperatures and evaporation during a specific growing season determine shoot biomass and seed yield and the duration of the reproductive growth phase.

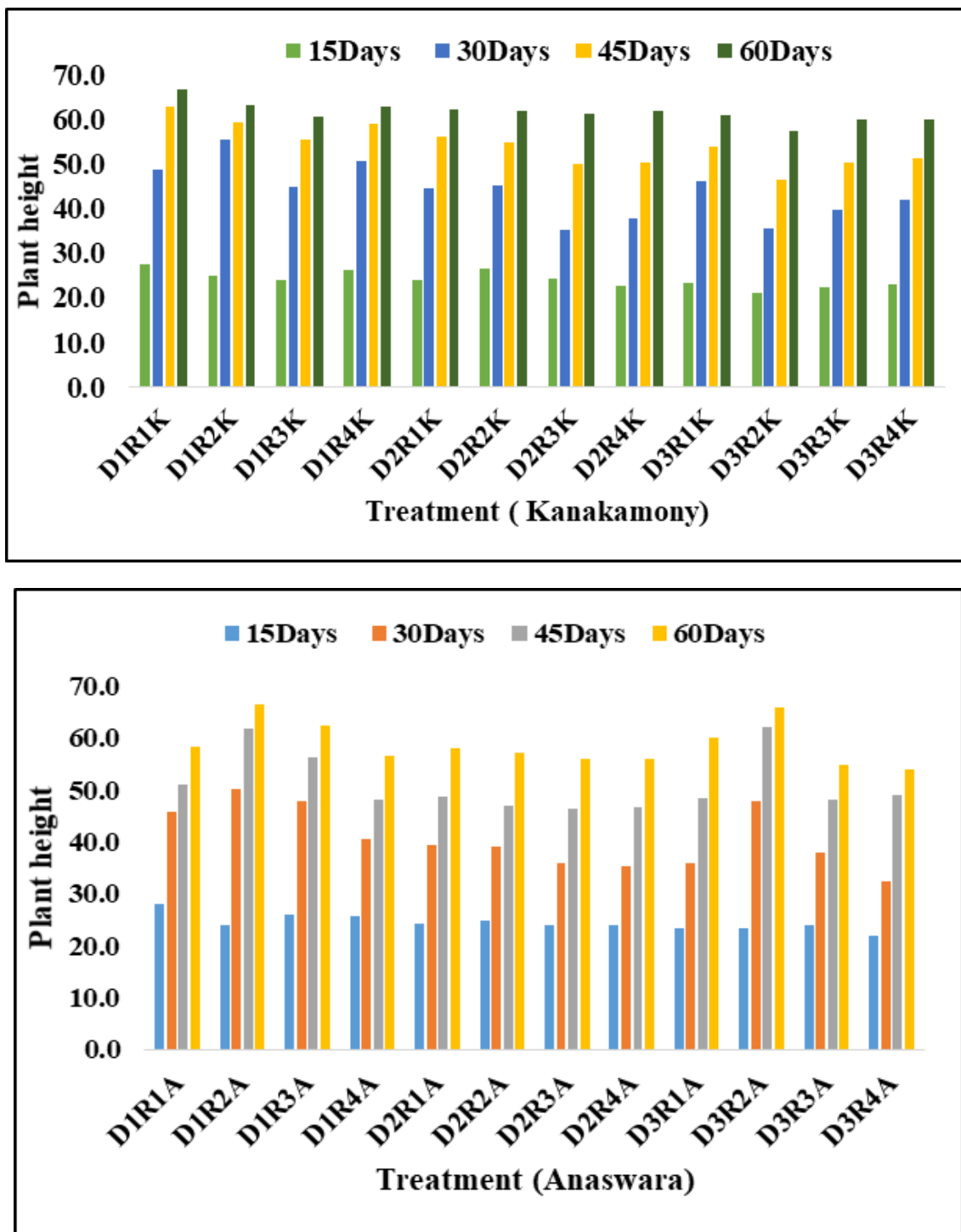


Fig 1: Height of the plants

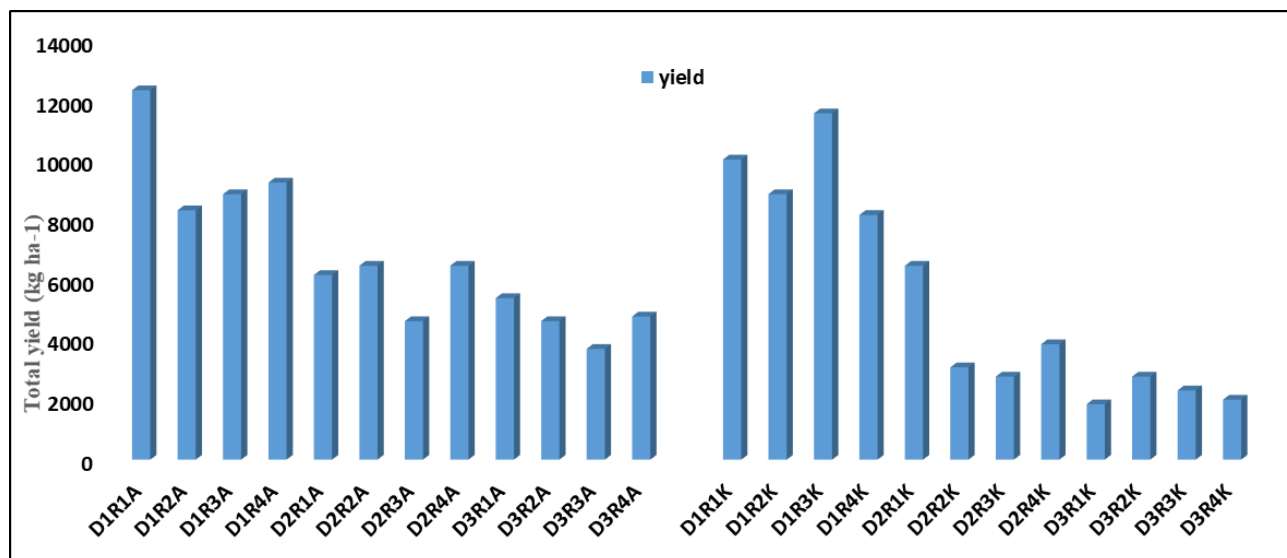


Fig 2: Total yield

Correlation studies were conducted between performance of a variety and different weather parameter

Table 1: Variety Anaswara

Parameters	Yield	Tmax	Tmin	RHI	RHII	Rhmean	WS	BSS	RF	EVP	RD
Yield	1	-0.673*	0.841**	0.640*	0.905**	0.894**	-0.839**	0.863**	.a	-0.901**	-0.061
Tmax	-0.673*	1	-0.438	-0.049	-0.787**	-0.620*	0.433	-0.5	.a	0.665*	-0.175
Tmin	0.841**	-0.438	1	0.919**	0.899**	0.977**	-1.000**	0.998**	.a	-0.963**	-0.273
RHI	0.640*	-0.049	0.919**	1	0.655*	0.814**	-0.922**	0.890**	.a	-0.779**	-0.38
RHII	0.905**	-0.787**	0.899**	0.655*	1	0.972**	-0.897**	0.928**	.a	-0.984**	-0.102
RHmean	0.894**	-0.620*	0.977**	0.814**	0.972**	1	-0.976**	0.990**	.a	-0.998**	-0.197
WS	-0.839**	0.433	-1.000**	-0.922**	-0.897**	-0.976**	1	-0.997**	.a	0.961**	0.275
BSS	0.863**	-0.5	0.998**	0.890**	0.928**	0.990**	-0.997**	1	.a	-0.979**	-0.25
RF	.a	.a	.a	.a	.a	.a	.a	.a	.a	.a	.a
EVP	-0.901**	0.665*	-0.963**	-0.779**	-0.984**	-0.998**	0.961**	-0.979**	.a	1	0.174
RD	-0.061	-0.175	-0.273	-0.38	-0.102	-0.197	0.275	-0.25	.a	0.174	1

Table 2: Variety Kanakamony

Parameters	Yield	Tmax	Tmin	RHI	RHII	Rhmean	WS	BSS	RF	EVP	RD
Yield	1	-0.701*	0.882**	0.867**	0.915**	0.967**	-0.911**	-0.715**	.a	-0.689*	0.966**
Tmax	-0.701*	1	-0.371	-0.336	-0.911**	-0.776**	0.441	1.000**	.a	1.000**	-0.655*
Tmin	0.882**	-0.371	1	0.999**	0.721**	0.874**	-0.997**	-0.39	.a	-0.354	0.945**
RHI	0.867**	-0.336	0.999**	1	0.695*	0.855**	-0.993**	-0.356	.a	-0.319	0.932**
RHII	0.915**	-0.911**	0.721**	0.695*	1	0.967**	-0.772**	-0.919**	.a	-0.903**	0.908**
RHmean	0.967**	-0.776**	0.874**	0.855**	0.967**	1	-0.909**	-0.789**	.a	-0.764**	0.985**
WS	-0.911**	0.441	-0.997**	-0.993**	-0.772**	-0.909**	1	0.46	.a	0.425	-0.967**
BSS	-0.715**	1.000**	-0.39	-0.356	-0.919**	-0.789**	0.46	1	.a	0.999**	-0.670*
RF	.a	.a	.a	.a	.a	.a	.a	.a	.a	-0.640*	1.000**
EVP	-0.689*	1.000**	-0.354	-0.319	-0.903**	-0.764**	0.425	0.999**	.a	1	-0.640*
RD	0.966**	-0.655*	0.945**	0.932**	0.908**	0.985**	-0.967**	-0.670*	.a	-0.640*	1

4. Conclusion

Cowpea cultivation is greatly influenced by various weather parameters. Weather parameters like minimum temperature, forenoon relative humidity and after noon relative humidity, rainfall and bright sunshine hour showed a detrimental effect on growth and yield of cowpea and the maximum temperature, wind speed, and evaporation showed a significant negative correlation. Among the different dates of sowing November 5th planting was found to be optimum for obtaining higher yield.

5. References

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