EFFECT OF CLIMATIC FACTORS ON FILLED GRAIN PERCENTAGE OF RICE VARIETIES FOR CULTIVATION DURING YALA SEASON IN THE LOW COUNTRY WET ZONE OF SRI LANKA

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INTRODUCTION

Sri Lanka claims self-sufficiency in rice production owing to conductive government policies and technological advancement in the rice industry. Rice serves as a staple food for people in the country and contributes to 16.9 %, 4.6 million metric tons of the country's agricultural GDP where 29% of the population is employed in the agriculture sector (Central bank of Sri Lanka 2019). Sri Lanka is highly sensitive to changing climatic conditions, where the production is often connected to risk and uncertainty (Walisinghe *et al* 2017). The climatic factors such as temperature, rainfall, sunshine, wind and humidity mainly affect crop cultivation. This study is designed to identify the most adaptable rice varieties for LCWZ of Sri Lanka due to changing climatic parameters during southwest monsoon and identify the effect of climatic parameters on spikelet sterility and pollen viability, filled grain percentage and finally the grain yield during the study period.

METHODOLOGY

This experiment was carried out in the Rice Research Station, Labuduwa, Galle, Sri Lanka, during the *Yala* season of year 2021. 23 varieties of rice were used and classified into three groups based on the duration of the crop: 2.5 months, 03 months and 3.5 months. The varieties of 2.5 months were Bg 251, Bg 252 and Bg 253. The varieties of 3.0-months were Bg300, Bg 310, Bg 314, Bg 312 and Bg 313.

The varieties of 3.5 months were Bg 94-1, Bg 353, Bg 352, Bg S2B7, Bg 359, Bg 358, Bg 366, At 362, At 354, Ld 12,6,22,1-2, Ld 365, Ld 368, Ld 408, Ld 371 and Bw 372.

These nursery dates were decided according to the flowering period of each variety. After two weeks, nursery plants were transplanted in the field. Each variety's seedlings were transplanted in three rows in a Randomized Complete Block Design (RCBD) with 02 replicates. The space of plants, basal fertilizer application, top dressing, pest and diseases management, and all other management practices were done according to the recommendations of the Department of Agriculture. The experimental plots were maintained without any stress from weeds, pests, and diseases.

The daily maximum and minimum temperature, amount of rainfall, relative humidity, wind speed, and evaporation were recorded. As the measurements, the number of panicles in each plant, empty seeds per panicle, weight of 1000 seeds, and filled grain percentage were used. Three plants were selected in each variety to get these measurements.

RESULTS AND DISCUSSION

All the flowering periods of the above 23 rice varieties were set in the month of July,. due to the high rainfall received in, the *Yala* season in the low country wet zone. The maximum air temperature was recorded on 5th, 13th, 29th July (28.5 ^{0}C) and the minimum temperature was

recorded on 1st, 9th, 23rd, 24th, 26th July (26.5^{0}C). The maximum rainfall was recorded on 9th July (32.9 mm). The minimum rainfall was recorded on 5th, 13th ,18th,19th ,20th,26th,29th ,30th July (00 mm).The maximum relative humidity was recorded on 24th, and 25th of July (92). The minimum relative humidity was recorded on 3rd, 15th and 21st July (79.5). The maximum wind speed was recorded on 10th July (21.8). The minimum wind speed was recorded on 23rd July (2.3). The maximum evaporation was recorded on 14th July (5.2). The minimum evaporation was recorded on 09th July (0.3).

Filled grain percentage

Filled grain percentage was the most important factor considered in this research. Bg 94/1, Bg 352, , Bg 359, Bg 358, Ld 365, Ld 368, Ld 408, Bg 366, Ld 371, At 313, Bw 312, Bg 300, BG 252, Bg 251 varieties were significantly different with the varieties in the planting date 1. Bg 94/1, At 353, Ld S_2B_7, Bg 359, At 362, Bg 358, Ld 368, Ld 371, At 313, Bw 312, Bg 314, Bg 252, Bg 251 varieties were significantly different from the varieties in the planting date 2. Bg 252 variety showed the highest filled grain percentage per panicle in the 2.5 months variety. At 313 variety showed highest filled grain percentage per panicle in 03 months variety. Ld 371 variety showed the highest filled grain percentage per panicle among the 3.5 months variety.

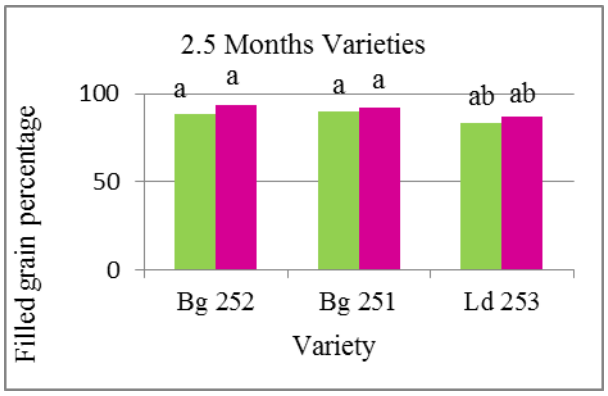

Figure 1a. Filled grain percentage of 2.5 months

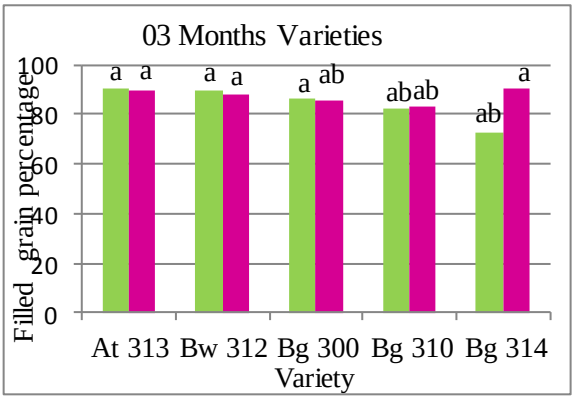

Figure 1b. Filled grain percentage of 03 months varieties

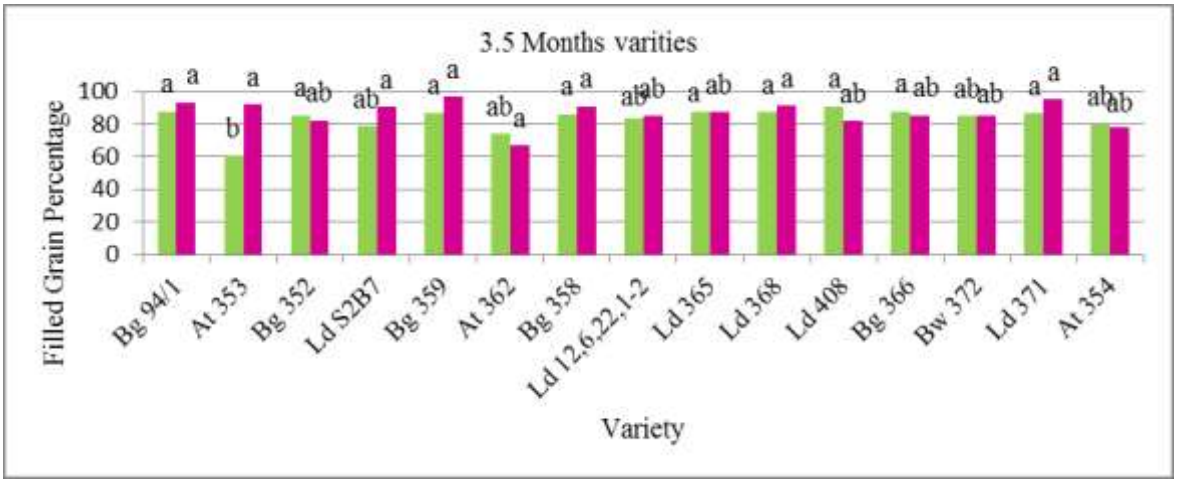

Figure 1c.Filled grain percentage of 3.5 months varieties

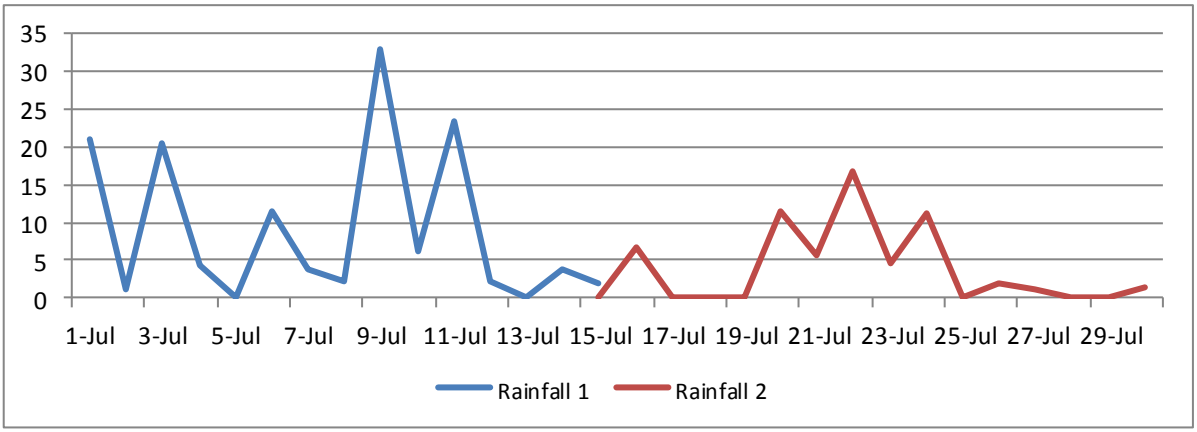

Figure 1d. Rainfall Distribution in the flowering period

Twenty three varieties of rice were arranged to start the flowering period from 1st to 15th July and 15th to 30th July.

The first flowering period (1st to 15th July) received the higher rainfall amount than the second flowering period (15th July to 30th July).

Rainfall affected the flowering period of 23 rice varieties in planting date 1.

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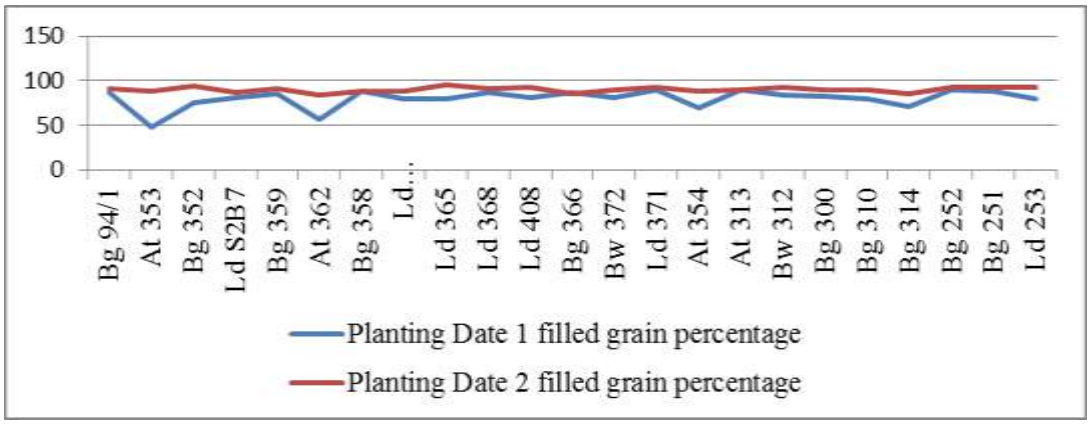

Figure 1e. Performance of rice varieties with filled grain percentage

Rainfall has affected the flowering period of 23 rice varieties in planting date 1. At 353, At 362, At 354,Bg 314 varieties were the most sensitive to the rainfall.

Stepwise multiple regression was performed between the grain filling percentage and the climatic parameters.(Rainfall, Relative Humidity, Temperature and Wind)

Rainfall is shown solely as a significant parameter in the stepwise regression and those were indicated in following equations:

Planting date 1

Grain filling percentage = 0.249Rainfall + 6.74

Planting date 2

Grain filling percentage = 0.294Rainfall + 2.77

CONCLUSION

Bg 251 variety showed the highest filled grain percentage on planting day 1 of 2.5 months varieties.
Bg 252 variety showed the highest filled grain percentage on planting day 2 of 2.5 months varieties.
At 313 variety showed the highest filled grain percentage in 03 months varieties respectively.
Bg 359 variety showed the highest filled grain percentage in 3.5 months varieties.
However, At 353 of 3.5 month variety also showed higher filled grain percentage and not significantly different from Bg 359 in planting date 2.
Further analysed climatic parameters and filled grain percentage with multiple regressions, rainfall only has shown significant affected to the filled grain percentage.
Therefore At 353, At 362, At 354, Bg 314 varieties among 3 months and 3.5-month varieties showed sensitivity to the rainfall respectively.

REFERENCES

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