Physiological basis of seed yield variation in soybean [*Glycine max* (L.) Merrill]

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SUMMARY

An experiment was consisting of six genotypes *viz.,* JS-71-05, Kuber, Chaturbhuj, Indira Soya -9, JS-335 and MACS-124 was to study the difference in growth and yield of soybean. The genotype MACS-124 showed maximum plant height among all other genotypes and recorded more number of leaves as well as leaf area index. Genotype, Kuber recorded highest total dry weight, absolute growth rate, relative growth rate and net assimilation rate. In yield attributing characters genotype Kuber recorded highest number of seed per pod and 100 seed weight while genotype JS-335 showed highest harvest index.

<u>**Key words**</u> : AGR, RGR, NAR, Genotype, Yield.

Soybean [*Glycine max* (L.) Merrill.] is recognised as one of the premier agricultural crop, which has revolutionized the agricultural economy with its immense potential for food, fuel and numerous industrial products. Its yield is very complex character, its depends upon a number of genetic and physiological factors interacting with environment. Due to uncertain constraints of productivity like lower sink demand is inviting the wide gap in critical yield status, resulting in stagnant genetic yield potential. In view of fast shrinkage of agricultural - resources, it is urgently needed to identify the possible key and physiological variables which are the physiological determinant and associated with the seed yield of crop. This could only the ray of hope in order to select the most suitable genotype for Chhattisgarh region and to understand the dynamic of yield variation associated with phenology of the crop. The present investigation was undertaken to study "physiological basis of seed yield variation in soybean" with following objectives to study the physiological efficiency and growth pattern of soybean genotypes and to evaluate the physiological traits associated with higher yield.

MATERIALS AND METHODS

The present investigation was carried out during *kharif* 2001 at the Instructional Farm, Indira Gandhi Agricultural University, Raipur Chhattisgarh. The experiment was laid out in Randomized Block Design (RBD) with three replications and six genotypes *viz.* JS-71-05, Kuber, Chaturbhuj, Indira Soya -9, JS-335 and MACS-124. Absolute growth rate (AGR) is the total gain in weight by a plant within specific time interval and measured and calculated by following formula:

$$AGR = \frac{w_2 - w_1}{t_2 - t_1}$$

where,
w_1 = total dry weight of plant at time t_1
w_2 = total dry weight of plant at time t_2
t_1 = initial time of observation
t_2 = final time of observation

Relative growth rate (RGR) is the increase in plant material unit per time was calculated by formula given by Fisher (1921)

$$RGR = \frac{\ln w_2 - \ln w_1}{t_2 - t_1}$$

where,
w_1 = total dry weight of plant at time t_1
w_2 = total dry weight of plant at time t_2
t_1 = initial time of observation.
t_2 = final time of observation.

Net assimilation rate (NAR) is expressed as increased in dry matter unit per leaf area per unit time; it was calculated by formula given by Gregory (1917) as following:

$$NAR = \frac{w_2 - w_1}{t_2 - t_1} \times \frac{\ln w_2 - \ln w_1}{A_2 - A_1}$$

where,
A_1 = leaf area per plant at time t_1
A_2 = leaf area per plant at time t_2

Leaf area index is the leaf area existing on unit ground was proposed by Watson (1952) and was

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