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A Review - Radiation Use Efficiency In Pulses Under Different Hydrothermal Regimes

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INTRODUCTION

The final yield of any crop is a continuous interaction of genetic variables and environmental factors to which crop is exposed. Radiation interception by a crop is directly affected by the biomass production during different crop growth stages.Biomass accumulation in a crop can be analyzed from intercepted radiation. Radiation use efficiency (RUE) can be defined as the amount of biomass produced per unit intercepted solar radiation. It is a key measure of photosynthetic performance of any crop (Muchow *et al*, 1993). .Summer/spring mungbean is sown from mid March to first week of April after the harvest of *Brassica* spp*.,* lentil, potato, toria; and in the second fortnight of April after the harvest of wheat in most of the northern part of India. Sowing dates and irrigation regimes depict varied performance and productivity of summer mungbean due to changed environment plant interactions. Crop grown during April-June needs frequent irrigation due to higher evaporative demand and intense radiation. A brief review of the radiation studies in mungbean and some other pulses/cereals under changed hydrothermal regimes is being discussed here.

Radiation interception in crop canopies:

The analysis of the growth and yield of various legumes shows that that water stress applied at seedling establishment reduced dry matter due to reduced leaf area development and more vertical leaf orientation. Muchow,(1982).Increased pubescence reported to increased slightly the albedo and decreased the net radiation over the crop surface Nielson , (1983).The soybean having dense pubescence, increased reflected short wave radiation and PAR by 3 to 5% and 8 to 11%, respectively. Nielson *et al.* (1984).The reduction in PAR interception were found more important upto 42 DAS in soybean, *Vigna radiata*, *Vigna mungo* and *Vigna unguiculata*. Differences in above ground dry matter between grain legumes found to be varied according to phenology of the crop and the water severity. Muchow, (1985).Koznarova (1987) evaluated the radiation measurements in lucern at different planting densities. Determination of PAR was recommended for assessing available energy at a given site under given weather conditions. Total radiation balance (including long wave radiation from the atmosphere and from a given surface) was also recommended for the evaluation of total energy absorbed by plants since long wave radiation components constituted a significant proportion of the radiation of the stand. A simulation study shows that in soybean, cowpea and *Vigna mungo*, the relationship describing the response of leaf area growth, radiation use efficiency and N fixation to soil water content differ a little among species. The delayed reproductive growth in response to water stress in *Vigna mungo* is also discussed Sinclair *et al,* (1987).The daily albedo values in soybean is found to be 0.26. Regression analysis shows that net radiation can be calculated by global solar radiation or by short wave radiation.Net radiation (Rn) flux above a frequently irrigated mungbean crop is reported to be higher than that above a less frequently irrigated crop. Straw mulched soil had higher albedo and lower net radiation flux. A linear regression model was developed for prediction of net radiation from solar radiation (Khera *et al,* 1993).Nam *et al* (1998) conducted an experiment on pigeonpea (*Cajanus cajan*) under well watered and water deficit conditions at ICRISAT, Patancheru and stated that water deficit conditions decreased the cumulative intercepted photosynthetically active radiation (CIR).In a study on effect of varied hydrothermal regimes on summer green gram c.v. SML-134 net radiation fluxes(Rn) was found less above less frequently irrigated crop. Higher Rn was observed above unmulched crop than that of 5t/ha wheat straw mulched crop (Ravi Kiran, 2002).

Radiation use efficiency:

In an experiment on soybean, cowpea and mungbean under different environmental conditions the slope of relationship between net biomass accumulation and intercepted radiation was linear throughout most of the growth, till the end of pod filling in all species and all environments. The decreased RUE prior to maturity was due to leaf shedding. For each species RUE was similar under different environment. The RUE during linear phase

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