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SHORT COMMUNICATION

EFFECT OF ORGANIC MANURES AND MICRONUTRIENTS ON CHLOROPHYLL CONTENT AND LEAF AREA DURATION OF WHEAT

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Present investigation was undertaken to examine the effect of organic manures and micronutrients on chlorophyll content and leaf area duration in wheat (*T. aestivum*). Studies indicated that application of organic manures along with recommended dose of fertilizer (RDF) increased the leaf chlorophyll content and leaf area duration (LAD) of wheat significantly over control. Further, combined application of RDF + Poultry manure (PM) @ 1 t ha^{-1} or farm yard manure (FYM) @ 10 t /ha with foliar spray of iron sulphate ($FeSO_4$) @ 0.5 per cent recorded significantly higher leaf chlorophyll content and LAD.

***Key words*: Chlorophyll, leaf area duration, micronutrients, organic manures**

Leaves are the most important contributors of yield as they fix carbon dioxide through photosynthetic mechanism. The efficiency of the leaves to produce assimilates and its persistence depends largely on the photosynthetic pigments of which the leaf chlorophyll content is of prime importance. The ability of a crop to produce higher yield is also dependent on the photosynthetic longevity of the leaves which is expressed as leaf area duration (LAD). To curb the trend of declining soil fertility and productivity there is a need to adopt the concept of integrated nutrient management (INM). Therefore, this is a need to find out the most effective combination of nutrients on leaf chlorophyll content and leaf area duration (LAD) of wheat.

A field experiment was conducted during *rabi* season of 2001-2002 at the Agricultural College Farm, Raichur wherein wheat (*T. aestivum*) was grown on deep black clay soil having 218, 36 and 246 kg ha^{-1} of available N, P_2O_5 and K_2O respectively; 1.95 and 0.024 ppm DTPA extractable Fe and Zn respectively; soil pH of 8.32 and organic carbon content of 0.75 per cent. There were four organic manure treatments in main plots and seven micronutrients and methods of application treatments in sub plots. The experiment was laid out in split-plot design and replicated thrice. Foliar spray of micronutrients ($FeSO_4$ and $ZnSO_4$) was done on 41st and 55th days after sowing (DAS) while, the soil application was made at the time of sowing along with the fertilizer as per treatment. Total leaf chlorophyll content was estimated by following method as suggested by Nanjareddy *et al*. (1990). Leaf area duration was calculated using the formula of Power *et al*. (1967).

At 60 DAS, significantly higher leaf chlorophyll content (2.534 mg g^{-1} fw) was recorded with the application of RDF + PM @ 1 t ha^{-1} when compared to control (1.686 mg g^{-1} fw and RDF along (2.228 mg g^{-1} fw) and it was on par with RDF + FYM @ 10 t ha^{-1} (2.524 mg g^{-1} fw (Table 1). The increased synthesis of chlorophyll due to the application of organic manures particularly poultry manure is due to the presence of appreciable quantities of magnesium which might have helped in the chlorophyll synthesis. Nehra *et al.* (2001) also reported increased chlorophyll 'a' and 'b' content in wheat leaves due to the application of vermicompost and FYM. All the micronutrients and methods of application positively influenced the leaf chlorophyll content. However, chlorophyll content in leaves was significantly higher with the foliar application of $FeSO_4$ @ 0.5 per cent

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Table 1. Total leaf chlorophyll content and leaf area duration of wheat as influenced by organic manures and micronutrients.

Treatments	Leaf chlorophyll content (mg g $^{-1}$ fw) 60 DAS					Leaf area duration (days) 31-60 DAS				
	M_1	M_2	M_3	M_4	Mean	M_1	M_2	M_3	M_4	Mean
S_1	1.393	1.950	2.260	2.267	1.968	40.70	71.20	75.50	76.30	65.93
S_2	1.690	2.197	2.317	2.310	2.203	44.70	76.55	82.25	81.70	71.30
S_3	1.853	2.447	2.753	2.813	2.542	43.25	73.30	84.50	80.80	70.46
S_4	1.733	2.330	2.660	2.687	2.428	47.90	80.00	92.25	93.20	78.34
S_5	1.720	2.330	2.630	2.680	2.415	43.15	72.60	82.95	79.50	69.55
S_6	1.693	2.090	2.417	2.413	2.228	43.05	75.35	80.35	79.65	69.60
S_7	1.717	2.250	2.630	2.567	2.366	41.95	72.25	79.40	81.50	68.78
Mean	1.686	2.228	2.524	2.534	2.243	43.53	74.46	82.46	81.81	70.57
				S.Em±	C.D. (5%)				S.Em.±	C.D. (5%)
Organic manures (M)				0.010	0.036				0.51	1.76
Micronutrients (S)				0.015	0.044				1.50	4.27
S at the same M				0.031	0.047				3.01	NS
M at the same or different S				0.030	0.086				2.83	NS

M_1: Control; M_2: RDF @ 100:75:50 kg NPK ha^{-1} M_3: RDF + Farmyard Manure (FYM) @ 10 t ha^{-1}; M_4: RDF + Poultry manure (PM) @ 1 t ha^{-1}; S_1: Control; S_2: Soil application of $FeSO_4$ @ 5 kg ha^{-1}; S_3: Foliar spray of $FeSO_4$ @ 0.5%; S_4: Soil application of $ZnSO_4$ @ 10 kg ha^{-1}; S_5: Foliar spray of $ZnSO_4$ @ 0.5%; S_6: Soil application of $FeSO_4$ @ 5 kg ha^{-1} + $ZnSO_4$ @ 10 kg ha^{-1}; S_7: Foliar spray of $FeSO_4$ @ 0.5% + $ZnSO_4$ @ 0.5%.

(2.542 mg g^{-1} fw followed by the soil application of $ZnSO_4$ @ 10 kg ha^{-1} (2.428 mg g^{-1} fw.) Combined application of RDF + PM @ 1 t ha^{-1} + foliar spray of $FeSO_4$ @ 0.5 per cent (M_4S_3) recorded maximum leaf chlorophyll content of 2.813 mg g^{-1} fw.

Leaf area duration (LAD) signifies photosynthetically active period and it was significantly influenced by the application of organic manures along with RDF during 31-60 DAS (Table 1). Application of RDF + FYM @ 10 t ha^{-1} accounted maximum LAD (82.46 days) which was significantly higher as compared to control (43.53 days) and RDF alone (74.46 days) but it was on par with RDF + PM @ 1 t ha^{-1} (81.81 days). Among micronutrients, soil application of $ZnSO_4$ @ 10 kg ha^{-1} recorded significantly higher LAD (78.34 days) when compared to rest of the micronutrient treatments and it was higher by 19 per cent when compared to control during 31-60 DAS. The increase in LAD due to the soil application of $ZnSO_4$ may be attributed to carbonic anhydrase, a zinc-metallo enzyme localized in the stroma of chloroplast, where it exerts a buffering action by mediating pH changes and prevent chloroplast protein from being denatured (Jacobson *et al*. 1975).

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