Assesment of Chlorophyll Content using Chlorophyll meter in Chickpea

Key Words: Chickpea, Chlorophyll content, Chlorophyll meter

Chickpea is an important grain legume cultivated on 10.38 million ha in 45 countries across the worid producing 8.57 million toons with a productivity of 830 Kg ha^{-1} (FAO 2004) .Since the crop is mostly grown arid resions on receding soil moisture, drought is the major constraint limiting the productivity. Breeding for drought tolerance or higher water use efficiency is difficult due to lack of simple screening methods. The utility of alternate traits such as carbon isotope discrimination (Farquhar et al., 1984). Specific leaf area, specific leaf nitrogen and SPAD chlorophyll meter readings (SCMR) (Nageswrarao *et al.,* 2001) have been suggested by several researchers. SCMR has direct linear relationship with extracted chlorophyll(Yadava,1986) and leaf nitrogen concentration (Bullock and Anderson , 1998). Chlorophyll meter is light in weight and can be used for faster and non destructive measurements of leaf chlorophyll content . Therfore in the present investigation an attempt was made to study utility of chlorophyll meter in chickpea to estimate genetic perameters for SCMR and also to study the relationship of SCMR with extracted chlorophyll content .

The experiment was takenup with ten genotypes of chickpea viz .,ICCV37,JG11 Annigeri JAKI 9218 , ICCV-10, ICCV-2 , vihar ,L BeG7 and Dollar in a three replicate randomized block design during Rabi , 2005-06 . Each entry was grown in four rows of 4m lenth by adopting a spacing of 30X10 cm.The crop was grown as rainfed under receding soil moisture in deep vertisols . All the management practices were followed to raise a good crop . A portable chlorophyll meter (SPAD502). The same leaves were collected in polythene bags and chlorophyll content (mg/g of leaf materials) in the leaves was determined as for McKinney(1941) . The data were subjected to analysis of variance and correlation between SCMR and total chlorophyll content of leaves was estimated as for Panse and Sukhatme (1985) . The phynotypic coefficient of variation (PCV), genotypic coefficient of variation (GCV) , heritability in broad sense and genetic advance as percent mean (GAM),were estimated as per Singh and Chaudery(1985).

Analysis of varience indicated highly significant differences among ten genotypes for SCMR and total chlorophyll content . Among the genotypes studied ,SCMR values ranged from 18.71 (ICCV10) to29.27 (Vihar) . in general higher SPAD values were recorded in Kabuli genotypes then desi types (table1) . Correlation coefficient between SCMR values and chlorophyll content was found to be highly significant (0.678**). Kashiwagi *et al.,* (2006) also utilized SPAD chlorophyll meter in chickpea and reported a relatively high SCMR values in ICCV2,aKabuki type than Annigiri and ICC4958. A positive relationship between SCMR and leaf chlorophyll content was reported in groundnut (Bindu Madhava *et al.,* 2003), com (Dwyer *et al* 1995) and wheat (Reeves *et al .,* 1993). Accordingly in the present set of chickpea genotypes also , a positive and significant correlation between SCMR and leaf chlorophyll content was observed .

Genetic parameters were estimated for SCMR and chlorophyll content for both the traits PCV values were higher than GCV values. This indicates that the expression of character was lessened under the influence of environment. Heritability in broad sense was also higher for SCMR (75%) and total chlorophyll content (50%) . The genetic advance expressed as per cent mean was moderate for SCMR (25.66%) and chlorophyll content (28.39%) . The effectiveness with which selection can be based on phenotypic performance to exploit genetic variability can be known from heritability estimates . However , the utility of heritability is increased when used in conjunctions with genetic advance under selection. High heritability and moderate genetic advance recorded in the present study for SCMR also indicates that SCMR could be used as a selection criterion in a chickpea crop improvement programmes.

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Table 1. SPAD chlorophyll meter readings and leaf chlorophyll content in promising Chickpea varieties.

Variety	SCMR	Total Chlorophyll Content (mg g l-1)
ICCV - 37	21.16	0.80
JG-11	21.70	0.92
Annigeri	19.65	0.80
JAKI-9218	20.02	0.89
ICCV-10	18.71	0.71
ICCV-2	24.39	1.07
KAK-2	27.88	1.13
VIHAR	29.27	1.64
LBeG-7	28.47	0.79
Dollar	24.87	0.99
Mean	23.61	0.97
C.D. (5%)	5.81	0.54
PCV	16.59	27.48
GCV	14.37	19.46
Heritability (bs)	0.75	0.50
GAM (5%)	25.66	28.39
GAM (5%)	32.86	36.38
Correlation	0.678**	

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