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Short Communication

EFFECT OF LIME INDUCED CHLOROSIS ON YIELD AND YIELD COMPONENTS OF GROUNDNUT (*ARACHIS HYPOGAEA* L.)

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ABSTRACT

A pot culture experiment was conducted during *rabi*-summer 2006 to evaluate the groundnut genotypes for lime induced chlorosis tolerance at College of Agriculture, University of Agricultural Sciences, Dharwad. The experiment was laid out in Completely Randomized Design with nine genotypes (*viz.*, TMV2, JL-24, DERM-5-1, GPBDM 4/25, GPBD-4, DERM (VLS), GPBDM 4/6, DERM15T and DERM14T) in three replications. The calcareous soil (9.5% lime) was used with recommended dose of nitrogen, phosphorus and potassium. The DERM and GPBDM genotypes recorded higher Total dry matter, yield and yield parameters as compared to TMV2, JL24 and GPBD4, which had higher per cent chlorosis. In DERM genotypes, DERM (VLS) had higher peroxidase activity, higher ferrous iron, chlorophyll content and was more iron efficient groundnut genotype as compared to all the genotype, however, the shelling per cent was least in this genotype.

KEYWORDS: Chlorosis, Genotypes, shelling per cent and kernel weight

INTRODUCTION

Groundnut (*Arachis hypogaea* L.) is one of the most important food crops of the world. It is the world's fourth most important source of edible oil and third most important source of vegetable protein (Anonymous, 2000). The lime-induced iron deficiency chlorosis (LIIC), commonly known as iron chlorosis, is of common occurrence in groundnut in calcareous and alkaline soils world-wide.

Iron chlorosis is caused by several factors such as higher concentration of carbonates and bicarbonates of Ca in presence of excess moisture, high pH, excessive P, deficiency of K and also due to toxicity of heavy metals such as Co, Zn, Cu, Cr and Cd *etc.*, Seatz and Peterson (1964) were of the opinion that the reaction between iron and carbonate ions may be a main cause for reducing iron availability to plants in calcareous soils.

It is estimated that a reduction in pod yield of 13 to 15 per cent in groundnut crop was observed due to iron chlorosis (Young, 1967; Gopal Krishnan and Srinivasan, 1976 and Anon., 1989). Iron deficiency in the extreme cases may lead to complete crop failure.

Identification of efficient groundnut genotypes to overcome/minimize lime induced chlorosis with higher productivity is a better option and long lasting for sustainable agriculture. The iron efficient lines could also be used further for groundnut crop improvement programme.

MATERIALS AND METHODS

A pot culture experiment was conducted during rabi-summer 2005 to evaluate the groundnut genotypes for lime induced chlorosis tolerance in the Main Agricultural Research Station, University of Agricultural Sciences, Dharwad. The following observations were recorded during the experiment.

Number of pods per plant

The total number of pods produced per plant was counted and recorded. The data on the effect of lime induced chlorosis on number of pods per plant in different groundnut genotypes is presented in Table 1.

Dry pod yield (g/plant)

Pods obtained from different pots were cleaned and dried after removing impurities and immature pods. The pods were weighed and yield was expressed in g/plant. The data on the effect of lime induced chlorosis on dry pod weight per plant in different groundnut genotypes is presented in Table 1.

Kernel weight

The weight in grams of the kernels was taken as kernel weight /plant. The data on kernel weight is presented in Table 1.

Shelling percentage

This was taken as the ratio of weight of kernels to weight of pods and expressed as percentage. The data on shelling percentage is presented in Table 1.

RESULTS AND DISCUSSION

Iron chlorosis is further quite common particularly in irrigated groundnut. Correction of lime-induced chlorosis could be effected by inorganic iron compounds, iron chelates, organic compounds, acidifying soil amendments and industrial by products and wastes. But, these are not long lasting and sustainable and economic. In order to increase production of groundnut in calcareous soils, the most effective, economic and particularly feasible approach is developing iron efficient groundnut genotypes with high yielding varieties. The present day cultivated varieties are iron inefficient. Commonly developing chlorosis on calcareous soils. Hence, breeders have developed mutants in groundnut, which appeared to have tolerance to chlorosis in calcareous soils. Therefore, an attempt has been made to evaluate the groundnut mutants along with ruling varieties in calcareous soil based on physiological and yield characters.

Yield is the manifestation of various morphological, physiological and growth parameters in any crop. In addition to pod yield in groundnut, several of its components such as number of pods, dry pod weight, kernel weight and shelling per cent are also important. Duncan *et al*. (1978) concluded that three physiological attributes *viz.*, partitioning of assimilates between vegetative and reproductive parts, length of pod filling period and rate of pod establishment are most important for determination of yield in groundnut. All these were affected by lime induced chlorosis in the present investigation. Reduction in the groundnut yield was observed to the extent of 13-50 per cent (Kulkarni, *et al*. 1994). Purnomo *et al*. (1997) reported that iron efficient groundnut genotype gave higher pod than local cultivars.

All the genotypes of DERM and GPBDM recorded higher number of pods per plant, dry pod weight and also the kernel weight with higher chlorophyll contents, low per cent chlorosis compared to TMV-2 and JL-24.

From this it could be inferred that these genotypes are relatively tolerant to lime induced chlorosis compared to low yielding genotypes. However, the genotype DERM (VLS) recorded higher number of pods per plant, dry pod weight and kernel weight. Strong positive correlation with iron at 45, 60 and 75 DAS was also observed. It was also highly efficient from the point of higher chlorophyll content, peroxidase activity, higher ferrous iron content and lower per cent chlorosis. But it did not reflect in the shelling percentage and in general it was negatively correlated with iron content at 45, 60 and 75 DAS. Thus, the highly chlorosis tolerant genotypes may not be efficient in producing higher pod yield and high chlorophyll content followed by high active iron content in leaves may be occurring at the cost of pod yield.

TABLE 1. Genotypic variation in groundnut for total number of pods, dry pod, kernel weight and shelling percentage as influenced by lime induced chlorosis

Genotypes	Number of pods per plant	Dry pod weight (g/plant)	Kernel weight (g/plant)	Shelling (%)
TMV2	14.11	10.66	7.66	66.14
GPBD4	16.11	12.76	8.82	77.06
JL-24	15.31	10.82	8.43	64.51
GPBDM 4/25	17.21	14.98	9.98	71.39
DERM (VLS)	18.31	18.45	13.45	72.54
GPBDM 4/6	17.46	15.67	10.62	66.23
DERM 15T	17.31	15.62	10.62	65.73
DERM 14 T	17.61	15.62	10.57	67.97
DERM – 5-1	17.41	15.07	10.07	70.80
Mean	16.72	14.39	10.02	69.15
S.Em±	0.38	0.28	0.27	0.53
CD at 5%	1.14	0.84	0.81	1.60

DAS: Days after sowing

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