Indian J. Genet., 77(1): 105-111 (2017)
DOI: 10.5958/0975-6906.2017.00014.1

Response of different peanut genotypes to reduced phosphorous availability

B. C. Ajay*, H. N. Meena, A. L. Singh, S. K. Bera, M. C. Dagla, Narendra Kumar and A. D. Makwana

ICAR-Directorate of Groundnut Research, PB#5, Ivnagar Road, Junagadh 362 001

(Received: July 2016; Revised: December 2016; Accepted: December 2016)

Abstract

Performances of 23 peanut genotypes comprising of popular varieties and few widely used germplasm accessions were compared under P-unfertilized and P-fertilized conditions during *kharif* and summer seasons to identify P-efficient and P-inefficient genotypes. Yield parameters and P concentrations in different plant parts at maturity were recorded and P-efficiency indices calculated. Significant differences among peanut genotypes, P levels and P × genotype interactions were observed for all the traits. LP caused 33% and 23% yield reduction during *kharif* and summer season respectively. However, performance of genotypes varied with the season and P supply. Genotypes FeESG-10, GG-7, GG-20 and TG-37A with high yield, kernel P-uptake and P concentration in leaf were P-efficient. On the contrary genotypes NRCG-162, GPBD-4, NRCG-7320 and NRCG-7085 were identified as P-inefficient. As an immediate solution to P deficient soils, the P-efficient genotypes could be directly grown in the LP soils with/ without using P to get high yield.

Key words: Peanut, P-unfertilized, P-fertilized, P efficiency, P uptake

Introduction

The peanut (*Arachis hypogaea* L.) is grown predominantly by small farmers in tropical and subtropical regions under light textured soils with frequent drought and soil infertility affecting yield (Singh 2011). Crop yield on 30-40% of world's arable land is limited by low P availability (Runge-Metzger 1995) as majority of applied P is transformed into insoluble form. Problem is further aggravated by inadequate and imbalanced use of fertilizers leading to reduced nutrient availability for crop growth finally affecting yield (Singh and Basu 2005). Hence, average peanut yield is less than 1000 kg/ha in more than 50% of the peanut growing countries of the world against world average of 1650 kg/ha (FAO 2013). Thus genotypes that can acquire and use P resources more efficiently from soils are more desirable as they avoid soil-P depletion, economical and stabilise yields (Singh and Basu 2005).

In peanut, studies related to low P tolerance are very limited and there are no well-defined selection criteria. Genotypes ICGV-86590, ICG-14475, mutant-68 and ICGV-92188 were identified as P-responsive based on in-vitro root morphogenetic studies (Kumar et al. 2009). Root hair like growth on pegs contribute to variation in phosphorus (P) uptake (Wissuwa and Ae 1999). Genotypes SAMNUT-10 and 21 were identified for low soil P conditions and for resource-poor farmers (Gabasawa and Yusuf 2013). Field studies involving large scale screening of peanut genotypes under P-unfertilized (LP) availability is very limited. Hence, the objective of the present study was to study the response of peanut genotypes to LP availability and determining their P efficiency index (PEI), P response efficiency (PRE), P stress factor (PSF) and P use efficiency.

Materials and methods

Site description and experimental study

The field screening, for two consecutive seasons during summer and rainy (*Kharif*), was conducted at the ICAR-Directorate of Groundnut Research, Junagadh), India in a medium black calcareous (17% $CaCO_3$) clayey, VerticUstochrept soil having 15kg/ha available P, pH 7.5, 0.7% organic C, 268kg/ha N, 300-400kg/ha K and 5kg/ha available S. Experiment was laid out in a split plot design with P levels in main plot and genotypes in sub-plot with two replications.

Twenty three peanut genotypes (12 varieties and

*Corresponding author's e-mail: ajaygpb@yahoo.co.in
Published by the Indian Society of Genetics & Plant Breeding, F2, First Floor, NASC Complex, PB#11312, IARI, New Delhi 110 012
Online management by http://epubs.icar.org.in/journal/index.php/IJGPB