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SUB-SOIL PHOSPHORUS PLACEMENT REDUCES THE COMPETITIVENESS OF BARNYARD GRASS [*ECHINOCHLOA CRUSGALLI* (L.) BEAUV.] ON THE EARLY GROWTH OF RICE (*ORYZA SATIVA* L.) IRRESPECTIVE OF THE MOISTURE AVAILABILITY

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Sri Lanka has reached self-sufficiency in rice (*Oryza sativa* L.). However, productivity of rice is low due to constraints such as high weed competition, low phosphorus (P) utilization efficiency, and water scarcity. As the abundance of grass weeds, water and P availability are closely inter-linked, two pot experiments were conducted under glasshouse conditions to investigate the impact of P placement, and different soil moisture regimes on the competitive effect of barnyard grass [BG; *Echinochloa crusgalli* (L.) Beauv.] on early growth of rice. In the first experiment, the impact of two P placement depths [0-5 cm (top soil) and 15-20 cm (sub-soil) from the soil surface of a pot] were tested on the early growth of two species in combination (*i.e.* rice-rice, rice-BG, BG-BG) and two destructive samplings were done at 14 days (appearance of the first tiller of both species; 5-leaf stage of rice and 3-leaf stage of BG), and 28 days (maximum or active tillering of both species) after germination. In the second experiment, two soil moisture levels were imposed as continuous flooding (3-cm water level above the soil surface throughout the experiment) and alternate wetting and drying (continuous flooding until tillering and then watered at 12 day intervals) apart from the P placement and plant combination. The soil used was a Reddish Brown Latasol (RBL) with a low total P (98 µg/g) and available P (1.5 µg/g) concentrations. Shoot and root dry weights, tissue P concentrations, root length and diameter, plant height and leaf counts per plant were measured. In the first experiment, sub soil P placement reduced the shoot and root dry weights (by 70-90 %), P concentrations (by 30-60 %) and the amount of P taken up (by 90 %) in BG than those in the top soil P placement. Root length and root surface area of BG were significantly higher when P was placed in the top soil layer (985 cm/plant and 71 cm^2/plant, respectively) than those under sub-soil P placement (561 cm/plant and 34 cm^2/plant, respectively). However, such a response was not observed in rice. Even though sub soil P placement enhanced the penetration of rice roots into sub-soil layers that of BG was reduced by 50 %. In both experiments, plant height and the number of leaves per plant of BG were reduced ($p<0.05$) when P was placed in the sub-soil layer irrespective of the moisture treatment and plant combination. The results indicate that subsoil P placement reduced the growth and development of BG while the growth of rice was unaffected providing a competitive advantage for rice over BG. Soil moisture treatments had no significant effect ($p>0.05$) on the growth and development of both the species during the early growth stages.