RESEARCH HIGHLIGHT: Locating genes in pearl millet to improve growth in low fertility soils

Global pearl millet production is limited most by low soil fertility and drought, and evidence suggests that phosphorus (P) is even more limiting than water in the drier zones of Africa and India. Rock phosphate, a slow-release and low-cost phosphorus fertilizer, is the most cost-effective solution for supplying P in Africa but plants differ in their ability to use this form of soil phosphate. If the genes responsible for phosphate uptake are mapped, it will be possible to use marker-assisted selection to improve nutrient uptake from low fertility soils.

Twenty pearl millet inbred lines were grown with two rock phosphate sources and a soluble phosphate control. A comparison between the two rock phosphate sources with differing solubilities in water showed that some pearl millet genotypes were much better than others (e.g., ICMP 85410-P7 and WSIL-P8) at utilising the more poorly soluble form – RP2 (Fig. 1).

The results suggest that root exploration and root acidification might be possible strategies used by pearl millet to acquire P from forms that have low solubility, and that the combination of these strategies varies across genotypes. All four of the genotypes that are better at utilising the less soluble rock phosphate are parents of existing populations that have already been mapped. This means that it only requires a single, simple experiment to identify the quantitative trait loci (QTLs) that may control this trait. These could then be used in marker-assisted breeding for pearl millet for Africa. The work on QTL mapping is planned to take place at ICRISAT in 2005.

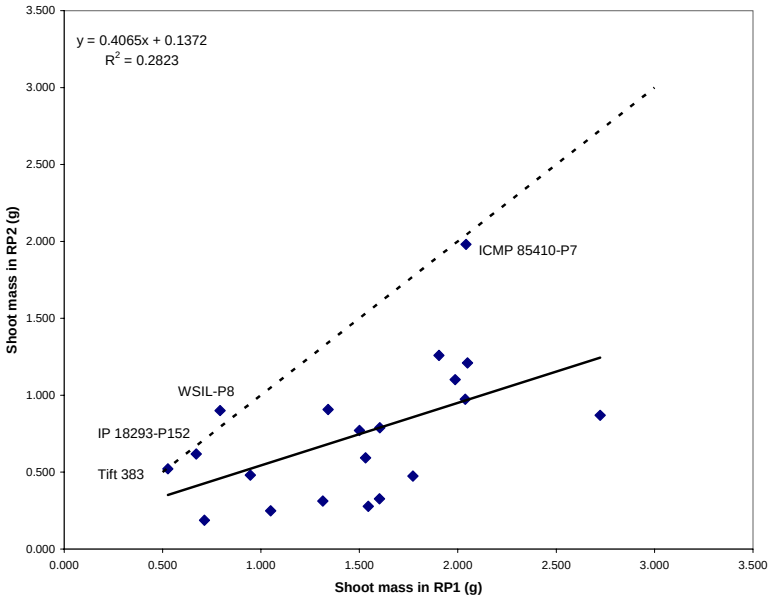

Figure 1. **Relationship of shoot biomass of 20 pearl millet inbreds 35 days after sowing in P-deficient Alfisol amended with two rock phosphates (RP1 or RP2) differing in their solubility in water where the solubility of RP1 > solubility of RP2.**