

UNDERSTANDING INFLUENCE OF P PLACEMENT UNDER FIELD CONDITIONS

Knowledge of the dominant solid P species present in the soil following application of P fertilizers, and linking that to potential P availability, would help understand how to manage P in efficiently reduced-till systems. The objective of this research was to understand the influence of placement (broadcast vs. deep-banded P), fertilizer source (granular vs liquid P), and time on reaction products of P under field conditions.

Summary Points

- Resin extractable P was greater for liquid P-treated soils when compared to the granular P-treated soils.
- Resin extractable P was lower for broadcast treatments as compared to deep-band treatments for both the time periods.
- Over a six-month period, reaction products of broadcast granular, broadcast -liquid and deep-banded-granular fertilizers formed less soluble compounds while deep-banded liquid P remained mainly as adsorbed P forms.

Conclusions

It appears that when liquid MAP is deep-placed in no-till soil systems, more P remains in resin extractable P forms for six months after fertilizer application. In contrast, broadcasted P, either in granular or in liquid form, tended to transform into less extractable P forms after five-week or six-month time periods. Formation of Fe-, Al-, and/or Ca-P solid species, with different solubility, may have been the reason for the observed differences in extractability or potential availability of P between broadcast and deep placed granular and liquid MAP evaluated in this study

Treatment	Al- Phosphates	Ca-Phosphates	Fe(III) Phosphate	Fe(II) Phosphate	Adsorbed P
Urea Broadcast (Control)	60.4	-	-	39.6	-
Gr. MAP Broadcast	46.3	-	-	-	53.6
Liquid MAP Broadcast	-	100	-	-	-
Urea Deep band (Control)	-	53.0	-	47.0	-
Gr. MAP Deep band	-	51.6	-	-	48.4
Liquid MAP Deep band	-	19.8	-	-	80.3

Table 1. Percentage of P species in the fertilized soil section (0-1" for broadcast and 3-4" for deep-band). determined with XANES spectra (six months after application).

Credits

Dr. Hettiarachchi is an Assistant Professor, Dr. Mengel is a Professor, and Mr. Khatiwada is a graduate Research Assistant in the Department of Agronomy at Kansas State University.

Full paper is available from the Fluid Journal archives:
<http://www.fluidjournalonline.com/?iid=58030>

