

### *Phosphorus and Sediment*

The panel held a face-to-face meeting in Frederick MD, to discuss approaches for estimating the phosphorus (P) and sediment (S) reduction efficiencies for the each new species and mixture. It was decided to continue the “relative to rye” approach that was used for N (above) for each new entry, and to multiply the resulting “relative to rye” value by the existing P or S reduction efficiency in Phase 5.3.2 to arrive at the final P and S effectiveness values. It was also decided to use Best Professional Judgment (BPJ) to estimate the “relative to rye” values, due to a lack of experimental data. It was suggested that each panelist develop their BPJ estimate by using the RNRE as a reference point, and then adjust the RNRE based on their BPJ of the residue production for the new entries. Each member was then requested to fill out an anonymous “ballot” listing their final BPJ estimate, based on their assessment of residue production compared to rye. Residue production was selected as a critical parameter because of the well-known relation between residue cover and soil loss (increasing residue-cover reduces soil loss), and the similar general relationship between sediment loss and P loss. The resulting anonymous BPJ estimates of relative P and S reductions were tabulated from the ten responding panelists and were reviewed on a follow-up conference call that considered several ways to summarize the voting data (see Appendix A). After consideration, the panel voted unanimously to summarize the individual “relative to rye” P and S reduction efficiencies with a simple average across all respondents. The resulting P relative reduction efficiencies and P effectiveness estimates are given Table 3, with Table 4 listing the corresponding S summary.

**Table 3. Examples of new cover crop species, and cover crop mixtures, Relative Phosphorus Reduction Efficiencies and final Phosphorus Effectiveness values for early plantings and all seeding methods in the Coastal Plain, Piedmont, and Karst physiographic regions.**

Proposed New Species, or Reference Species (i.e. Rye)	Relative Phosphorus Reduction Efficiency (relative to rye) as estimated by Panelists Best Professional Judgment	Final Phosphorus Effectiveness Phase 5.3.2
----- Early planting, all seeding methods, high tillage -----		
Annual Ryegrass (ARG)	0.70	0.10
Annual Legume	0.38	0.06
Annual Legume + Grass	0.66	0.10
Brassica (winter hardy)	0.65	0.10
Forage Radish	0.40	0.06
Forage Radish + Grass	0.54	0.08
Triticale	0.81	0.12
Oats (winter hardy)	0.63	0.09
Oats (winter killed)	0.37	0.06
Rye (Ref. Species)	1.00	0.15

**Table 4. Examples of new cover crop species, and cover crop mixtures, Relative Sediment Reduction Efficiencies and final Sediment Effectiveness values for early plantings and all seeding methods in the Coastal Plain, Piedmont, and Karst physiographic regions.**

Proposed New Species, or Reference Species (i.e. Rye)	Relative Sediment Reduction Efficiency (relative to rye) as estimated by Panelists Best Professional Judgment	Final Sediment Effectiveness Phase 5.3.2
----- Early planting, all seeding methods, high tillage -----		
Annual Ryegrass (ARG)	0.73	0.15
Annual Legume	0.42	0.08
Annual Legume + Grass	0.75	0.15
Brassica (winter hardy)	0.65	0.13
Forage Radish	0.44	0.09
Forage Radish + Grass	0.62	0.12
Triticale	0.85	0.17
Oats (winter hardy)	0.68	0.14
Oats (winter killed)	0.41	0.08
Rye (Ref. Species)	1.00	0.20

The BPJ estimates show a strong relationship between the P and the S relative reduction efficiencies because both estimates emphasized residue cover, although the P reduction efficiencies were consistently somewhat lower than S. However, some noteworthy differences occur between the results in Tables 3 and 4 compared to the N results in Table 1. For example, the P and S “relative to rye” estimates for an annual legume is about 0.4 in Tables 3 and 4, while the corresponding N estimate is 0.16 in Table 1; which is due to the legume providing residues as a result of N fixation, while legume N-fixation was not credited as residual-N recovery in Table 1. Another noteworthy difference occurred with forage radish, which is a species that winter kills and leaves minimal residues in the spring. The forage radish growth habit results in a lower P and S “relative to rye” values of about 0.42 in Tables 3 and 4, compared to a residual-N recovery estimate of 0.58 in Table 1.