Synchronization of N Mineralized from Green Manure with N Uptake by Spring Wheat. (S04-cochran155627-Poster)

Authors:

- V.L.Cochran* USDA-ARS, Sidney, MT
- R.L.Kolberg USDA-ARS, Sidney, MT

Abstract:

Wheat-fallow rotations are extensively practiced in non-irrigated, semiarid climates of the northern Great Plains to reduce the risk of crop failure during drought. However, excessive tillage and erosion has reduced soil organic matter to one-half original levels in many soils and increased the dependency on commercial fertilizer. A field study was started in 1992 to evaluate the feasibility of growing lentils as green manure and terminating at full bloom. The following treatments were used in rotation with spring wheat: 1) tilled fallow, 2) chemical fallow, 3) lentils terminated mechanically, 4) lentils terminated chemically, and 5) continuous spring wheat. Wheat after fallow or after wheat received 30 kg N/ha before planting, but no N was applied after green-manured lentils. Growing lentils to full bloom did not reduce subsequent spring profile water compared to tilled or chemical fallow. However, green manure did not supply adequate N to wheat until completing three rotation cycles. Since then, yields and grain protein levels have equaled those following fallow. Annual yields of continuous wheat have been lower, but cumulative grain yields were about 25% greater than where fallow of green manure was used. Lentil residue returned an average of 92 kg N/ha each cycle with no difference between termination methods. Green manure contributed an average of 32 kg N/ha each cycle to mineralization, estimated by N balance methods. Nitrogen mineralization was greater after fallow than after green manure or wheat during the first 2 weeks after planting, but there was no difference between treatments the rest of the summer.

Corresponding Author Information:

Verlan Cochran USDA-ARS 1500 N Central Ave. Sidney, MT 59270 phone: (406)433-9402 fax: (406) 433-5038 e-mail: vcochran@sidney.ars.usda.gov

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