SMALL GRAINS BULLETIN

Small Grains, such as Winter and Spring Wheat, Barley and Oats, are grown around the world in a variety of soil and climate environments. Small grains are a popular rotation and cover crop as well as a major cash crop for livestock and human consumption. The environmental conditions in which these crops are grown are often extreme and unpredictable during each growing season. Use of starter fertilizers applied at planting is a widely accepted Best Management Practice (BMP) for grain production. During a season, small grains experience extremes in temperature, humidity, and soil moisture. These variations have an effect on the performance and efficiency of crop inputs such as fertilizer.

Fertilizer Management Challenge
Consistent performance from crop inputs in an inconsistent environment is the primary concern for small grain production worldwide. Where P is deficient, phosphorous applications have shown very profitable yield and nitrogen use efficiency responses. Adequate available phosphorous is critical to early growth and yield potential. Most soils where small grains are grown, rapidly tie up applied phosphorous prior to root interception and uptake.

Applied nitrogen in the fall and spring of each year is rapidly converted to soluble forms that can be toxic to germinating seedlings as well as transported through the profile and away from the root zone. Starter N is often the only source of N for young plants until a top dress application is made in the spring. This in-season application is often delayed due to weather and/or timing concerns with weed control programs. In some environments, poor N efficiency (crop uptake) leads to environmental concerns through leaching of nitrates into ground water. Using a controlled-release fertilizer product in fertilizer programs may provide a new tool to help solve these problems of efficiency, while adding to each grower's bottom line.

Remedy
Simplot Soilbuilders provides premium fertilizer blends that contain POLYON coated Urea (PCU) and/or POLYON coated 11-52-0 (PCMAP). These blends are well suited as an economical small grain starter program. The release rates of N and P from the POLYON coated materials are controlled by temperature. Essential nutrition is supplied at a rate that matches well to the growth rate of the crop so that exposure to the soil environment is reduced. Fertilizer blends containing PCU and PCMAP can be custom made to meet specific needs of customers. Blending small percentages of POLYON coated materials into starter blends for small grains increases crop safety, nutrient uptake efficiency, and improves grain quality and yield.

Research from Belleville and St Johns, Ks. in 1999 (Figure 1) demonstrates the potential of seedling injury from 30 lb/acre applied N as Urea with the seed at planting. A 23% and over 50% yield loss was seen at Belleville and St. Johns respectively due to using Urea instead of PCU for 30 lb/acre N with the seed. POLYON coated Urea, due to controlled release of N, provides a factor of safety to emerging crops while providing N to the plants when and where it is needed. The in-season treatment of Urea with no starter N yielded as well as the PCU starter alone for this study. Using PCU as a % of total starter nitrogen will provide

Figure 1 – Crop Safety
a starter “pop-up” effect, reduce the risk of germination problems, and allow the application of higher rates of N at planting to support crop growth until in-season applications are made.

USDA research has shown (Figure 2) that POLYON coated 11-52-0, due to controlled release of P, increases the efficiency of phosphorous applications made at planting. Phosphorous is supplied when the crop is ready to use it rather than allowing P-fixation to occur in the soil. When phosphorous uptake by a crop is increased, other nutrients such as Nitrogen need to match the increase in yield potential.

A primary concern for small grain production is to realize a favorable return on investment for each and all crop inputs. Research in Kimball County, Ne. during the 1999-2000 season (Table 1) shows consistent positive effects by adding PCU and PCMAP into the starter blend for dryland winter wheat.

**Treatment A** - Standard practice of 20 lb N and 15 lb P per acre using Urea and 11-52-0.
Lowest yield, protein %, and net income in the study

**Treatment B** - 20 lb N and 15 lb P per acre - 25% of the N supplied as PCU (42-0-0)
Higher yield than A with significant increase in protein, highest net income

**Treatment C** - 20 lb N and 15 lb P per acre - 33% of the P supplied as PCMAP (10-48-0)
Highest yield, normal protein %, higher net income than A

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Moisture %</th>
<th>Protein %</th>
<th>Yield Bu/ac</th>
<th>Starter $/ac</th>
<th>Net Income $/ac</th>
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<tr>
<td>A</td>
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<td>54.0</td>
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</table>

**Table 1:** Winter Wheat response to POLYON coated N and P applied at planting
4 replication averages, Budget figures: $3 / Bushel; Protein bonus $0.50 / Bu / pt above 12.5%

Suggestions for use: Simplot Premium Starter Blends
Fall seeded: 25% of total N and 25% of total P supplied as 42-0-0 and 10-48-0
Spring Seeded: 20% of total N and 35% of total P supplied as 43-0-0 and 10-48-0
Summer crops: 25% of total N and 35% of total P supplied as 42-0-0 and 10-48-0

POLYON coated fertilizers release nutrients through osmosis. The osmotic process, controlled by a temperature / pressure gradient through a membrane, allows a consistent and gradual diffusion of nutrients through the Polymer coating. Each granule slowly meters nutrients to the surrounding root zone, for months of continual feeding. Rainfall or microbial activity does not affect the release. The warmer the soil, the more active the osmotic process. The chosen coating thickness can fit each individual nutrient release goal. The programmed release is at such a pace, that there is virtually no nutrient loss through leaching and exposure to soil fixation. More efficient use of applied nitrogen and phosphorous.