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PLACING FERTILIZER IN-FURROW WITH THE SEED

Placing fertilizer in the seed furrow during the planting operation is a common practice in small grain production, and to a lesser extent in row crop production. In-furrow fertilization is an effective crop production management practice, but some caution should be used since over-application and mismanagement can result in seedling damage, and ultimate stand and yield loss. Following are some of the factors affecting how much fertilizer can be safely applied with the seed.

- **Type of crop:** Some crops are more susceptible to injury from in-furrow fertilization than others. Oil seed crops are particularly sensitive, therefore most guidelines allow no fertilizer placed with the seed of these crops. The general order of sensitivity (most to least) among major Great Plains crops is soybeans > sorghum > corn > small grains.
- **Type of fertilizer:** Fertilizers are salts, and these salts can affect the ability of the seedling to absorb water... too much fertilizer (salt) and desiccation or "burn" can occur. Some fertilizer materials have higher salt index or burn potential than others. Salt index values are usually included in basic agronomic texts or are available from fertilizer dealers or extension resources. As a general rule, most common N and K fertilizers have higher salt index than P fertilizers; therefore, a common predictor for the potential for salt damage is the sum of $N+K_2O$ per acre applied with the seed. For example, most guidelines for corn in 30 in. rows will allow for no more than 10 lb/A $N+K_2O$ in medium to fine textured soils (no urea containing products).
- **Ammonia formation potential of fertilizer:** Fertilizers that have the potential to release free ammonia can cause ammonia toxicity to seed. Thus, in-furrow placement of urea-containing fertilizers is usually not advisable. In some cases UAN is applied successfully in-furrow in small grain production, but there is a notable risk in this practice because of the potential for ammonia damage. The use of urea or UAN in-furrow in row crop production is even more risky and should be avoided.
- **Row spacing:** For a specific set of circumstances (crop, soil conditions, etc.) safe rate of in-furrow fertilizer increases as row space narrows or decreases. This is because narrowing row space has the effect of diluting fertilizer over more linear feet of row.
- **Soil type and environment:** Soil conditions that tend to concentrate salts or stress the germinating seed increase the potential for damage. So, the safe limit for in-furrow fertilization is reduced with sandier soil texture and in drier soil conditions. Also, environmental conditions that induce stress and/or slow germination (e.g., cold temperature) can prolong fertilizer-seed contact and thus increase the likelihood of damage.
- **Seed bed utilization:** The more scatter there is between seed and fertilizer in the seed band or row the more fertilizer can be safely applied. The type of planting equipment and seed opener influences the intimacy of seed-fertilizer contact. The concept of "seed bed utilization" has been used to address this factor. SBU is simply the seed row width divided by the row width, i.e., proportion of row width occupied by seed row. The wider the seed row for a specific row width the greater the SBU. As SBU increases so does the safe rate of in-furrow fertilization.

The information presented here is rather conceptual and general in nature. A detailed listing of recommendations and guidelines is beyond the scope of this brief publication. For more specific information regarding safe rates of in-furrow fertilization for specific crops and conditions one should refer to university extension resources, and/or consult a knowledgeable crop adviser or industry professional.

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Abbreviations: N = nitrogen; P = phosphorus; K = potassium; SBU = seed bed utilization; UAN = urea ammonium nitrate.

Note: *Plant Nutrition TODAY* articles are available online at the IPNI website: www.ipni.net/pnt