

Enhancing Alfalfa Yields & Stand Life by Improving Management of Seed Rot & Seedling Damping Off

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Rapid and uniform seedling emergence is critical for obtaining a productive and persistent stand of alfalfa. In many locations, alfalfa seeds are planted into cold, wet soil conditions that are ideal for seed rot and damping-off to occur caused by a complex of soilborne pathogens. Seed rot and damping-off is managed by over-seeding to offset seed and seedling losses and by use of anti-oomycete (oomicide) and fungicide seed treatments. Apron (metalaxyl) and Apron XL (mefanoxam), Stamina (azoxystrobin), and Maxim 4FS (fludioxonil) are the most widely used alfalfa seed treatments. However, recent experiments indicate that seed treatments could be improved to obtain greater seedling emergence and root health. Commercial formulations of seed treatments that had a single or mixture of up to three active ingredients were tested against alfalfa seed rot and damping-off pathogens in agar plated assays to determine the concentration causing 50% inhibition (EC_{50}) of mycelial growth. EverGol Energy, a combination of metalaxyl, prothioconazole, and penflufen, resulted in growth inhibition of all pathogens: excellent to very good EC_{50} values against *Pythium* spp., excellent values against *Phytophthora medicaginis*, good to fair values against *Fusarium* species, and good values against *Aphanomyces euteiches*. Intego Solo (ethaboxam) had very good values against *Pythium* spp., excellent values against *A. euteiches*, excellent to very good values against *P. medicaginis*, and poor activity against *Fusarium* species. ApronXL, EverGol Energy, and Intego Solo were tested as seed treatments in standard tests with single pathogens, in artificially infested soil, and in field soils from locations with a history of poor stand establishment. Protection from *Pythium* spp. by seed treatment with EverGol Energy was similar to that provided by ApronXL in agar plate bioassays and in infested soil assays indicating that it could be an effective alternative for management of *Pythium* seed rot and damping-off of alfalfa. Modest protection by EverGol Energy treatments was observed for *Phytophthora* root rot and *Aphanomyces* root rot in standard tests. However, in bioassays with field soils with a mixture of pathogens, none of the seed treatments tested (ApronXL, Stamina, Evergol Energy, Intego Solo) improved seedling health compared to the untreated control. Field trials found small effects of seed treatments on plant counts at the four to six trifoliolate stage and for second harvest dry matter yield at one location. Lack of efficacy of seed treatments in field environments is likely due to the presence of multiple aggressive pathogens. Our results show that seed treatments provide some early season protection of alfalfa seeds from seed rot and damping-off and can augment genetic resistance to *Phytophthora* root rot for early season protection. However, because these pathogens can be active at later times during the season, deployment of high levels of genetic resistance are needed. Development of resistance to *Pythium* root rot and higher levels of resistance to race 2 strains of *A. euteiches* in alfalfa cultivars is needed for locations prone to poor drainage and high levels of precipitation.