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Soybean biological seed treatments

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Seed treatment on soybeans have been and currently are primarily hard chemistries, but over the years more biologicals have been used in conjunction with the traditional hard chemistries. Biological seed treatments covers a very wide range of characteristics. There are inoculums that help nitrogen fixation for the plant, biofungicides, bionematicides and others that help with plant growth.

*Bradyrhizobium* is an inoculum that has been applied on soybeans for a very long time and was most likely the first biological seed treatment on soybeans. *Bradyrhizobium* is a bacteria that will form nodules on soybean roots that form a symbiotic relationship with soybeans that helps the plant fix nitrogen while it gets some carbohydrates in return.

VOTiVO, *Bacillus firmus*, in 2011 which was the first biological pesticide that was used widely as a seed treatment on soybeans. VOTiVO is a biological nematicide that grows with the roots and creates a biological barrier around the roots as the roots grow which protects the young roots from infestation from nematodes.

Clariva, *Pasteuria nishizawae,* is another biological nematicide that was released in 2014. Clariva works by killing the soybean cyst nematode. Data from Iowa State University and Iowa Soybean Association showed that Clariva reduced soybean cyst nematode egg numbers compared to the base seed treatment by 40 percent.

BioConsortia uses an Advanced Microbial Selection (AMS) to make directed selection of the microbiome for the discovery of beneficial microbes and consortia. Through the AMS process microbial communities are selected for desirable phenotypes through selection rounds. This results in an accumulation of microbes responsible for enhanced targeted traits. Targeted traits include helping the plant with water use efficiency in dry environments, controlling diseases and nematodes, help with nutrient availability and general plant health.