Chemical Treatments for Horticultural Seeds

Kyle W. Rushing[1]

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Fungicides, insecticides, plant-growth-regulating compounds, minor elements, nutrients, colorants, inoculants, and inert materials often are used to treat horticultural seeds. Many of these treatments improve emergence when insect and disease pressures are high or seeds are under environmental stress. Some materials, such as colorants or inert materials, have little effect on germination performance, but make seeds easier to handle.

Many crops are dependent on seed treatments to ensure maximum productivity. Peanuts planted without fungicide treatment often become diseased and rot before emergence can occur. Corn seed unprotected against *Pythium* has given 11% lower yield compared to seed treated with captan(unpublished data). In addition to diseases, early season attack of crops by soil-borne insects, such as grubs, maggots, and wireworms, and foliar insects such as thrips, aphids, and whiteflies, can be very destructive. Insect damage can result in both crop stand losses and damaged plants that are susceptible to pathogenic attack.

Exciting new chemicals have been developed to treat seeds of some agronomic crops. These new products show great promise in controlling diseases and insects not controlled by previous generations of chemicals, are from new chemical families, and are highly systemic, Activity has been found against many types of foliar diseases, as well as previously uncontrolled root disease. In all cases, the chemicals tend to work closely with genetic resistance, which generally becomes functional in mature plants, thus enhancing the level of defense against many diseases.

Metalaxyl, triadimenol, imazalil, carboxin, thiabendazole, streptomycin, and other new fungicides have become important tools for solving disease problems. Needless to say, the older protestant products (nonsystemic) will continue to play a significant role in seed- and soil-borne disease control. Years of testing and commercial use have shown that combinations of protestant and systemic compounds provide the best protection as seed treatments.

A new systemic and contact insecticide, imadicloprid, is under development. Imadicloprid has been evaluated favorably by the U.S. Environmental Protection Agency because of its broad-spectrum activity and broad crop applicability; favorable characteristics for applicator/consumer environments; new mode of action for insecticide-resistance management; and potential as a new tool for integrated pest management. Imadicloprid exhibits primary activity against sucking insects such as aphids, leafhoppers, thrips, and whiteflies, Many of these insects are vectors for bacterial and viral diseases. Imadicloprid maybe used as a seed treatment to control vectors and reduce the incidence of disease. Sequential applications may be used after emergence to increase the length of the control period.

Imadicloprid has been shown to suppress many insects on ornamental plants and should be approved soon for use on turf and ornamental as a foliar spray. When applied directly to the seed, imadicloprid provides excellent insect suppression for a period of 50 to 60 days postemergence. Imadicloprid will fill many voids that may occur if insecticides currently used as seed treatments are removed from the market.

Changes are occurring in crop production that will have an impact on the importance of seed treatments, The trend toward minimum tillage will continue to increase. New government programs now require reduced tillage by the growers who wish to participate. Soil temperatures are cooler under minimum tillage, and the plant residue serves as a source of disease inoculum and harbors many insect pests. With many crops, planting untreated seeds significantly reduces yield potential. Today, researchers are realigning field research programs to address the effect that minimum tillage will have on field emergence, New seed treatments are needed to help solve problems inherent in conservation tillage systems.

Seed-applied pesticides have been underused in horticulture for many years. Rather than applying pesticides directly to the seed, many producers use soil drenches, dips, granular applications, and foliar spray applications to provide the desired control. The chemical industry is reluctant to register new products for horticultural crops because the potential liabilities and registration costs are greater than the limited market potential. Thus, it is unlikely that many new seed treatment chemicals will be developed for horticultural crops in the coming years.

As the other participants in this workshop have indicated, new seed treatment technologies exist that have the potential to protect seeds and improve performance. These technologies offer great promise because of the uncertain future of

Gustafson, Inc., Da//as, Texas.

[1]Vice President of Research and Development.

traditional chemical pesticides. It is apparent that many chemicals will be lost and not defended for minor or specialty crop use during the re-registration process. Because some chemicals that are applied to the foliage or the soil may exert a negative impact on the environment, many needed products may not qualify under new guidelines for registration, Using these products as seed treatments may be the best means for application, because the quantity of product needed is small, the environmental impact is minimal, and human exposure is limited. Because of the growing concern over chemical usage, our company has developed an integrated approach to product development that includes the use of both biological control measures, as well as traditional chemical products,

At present, only a limited number of chemical products are registered for horticultural crops, Now would be a good time to request major chemical suppliers to develop and register more seed-treatment products for horticultural crops. Minor crop registration often rides on the coattails of major crops. As registrations are lost for major crops, minor uses will vanish, even though many uses are environmentally defensible, The issue becomes even more critical on a state-to-state basis,

I recommend that ASHS take an initiative to ensure the future availability of safe and effective agricultural chemicals. The formation of an ad hoc committee to address pesticide use and development would help to improve communication among horticulturists, chemical companies, and the federal government. ASHS could help chemical companies determine the priorities by crop, pest, and need for control, Requests from the ASHS ad hoc committee could be communicated to the Seed Treatment Committee and Seed Coatings Committee of the American Seed Trade Assn. Upon receipt of priority lists and with the support of these committees, action could be taken to initiate a request for use from proprietary chemical companies, Also, concerted and collaborative research could be initiated to determine use rates and the level of protection that the new chemical affords, The ASHS ad hoc committee might also take the lead in discussing the potential waiving of liability from the chemical industry,

As one can see, the use of crop protection materials has changed and will continue to change in the future. It is our responsibility, as an industry and as a nation, to advocate the safe use of agricultural chemicals in the environment.