Introduction to the Workshop

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For most economic crops, stand establishment begins with the sowing of botanical seed. Today, growers assume that seeds supplied to them by the seed industry will be of superior quality and will germinate rapidly and uniformly. Before marketing their product, the seed industry must therefore ensure that the multitude of factors that interact to produce high-quality seed are optimized.

High seed quality is the objective of any seed producer. Seed quality is initially influenced by the genetic potential of the crop. Seeds of some crops, such as the seedless watermelon, are of inherently low quality, many times necessitating stand establishment by transplanting (Peirce, 1987). Seeds of other crops, such as parsley (Harrington and Minges, 1954) require almost 2 weeks to emerge, even under optimum soil temperatures. Others, such as onion, produce inherently weak seedlings, susceptible to soil crusting, soil pathogen attack, and weed competition (Nonnecke, 1989). Differences in seed performance among cultivars of the same crop, and even among seed lots of the same cultivar, serve as significant challenges to the seed producer.

The seed producer must attempt to optimize the environment in which the seed crop is produced. Generally, field seed production is located in areas of low humidity that receive little or no rainfall during the harvest season (Kelly, 1988). Hybrid seed production is primarily centered in areas of the world with low labor wages due to the extensive hand labor required for many crosses (George, 1985).

In either field or greenhouse seed production, plant density, plant nutrition, plant moisture status, pest protection, and pollinator selection must be addressed (George, 1985). In hybrid seed production, the planting time of male and female parents is critical in order that they nick at flowering. The ratio of male to female rows is also critical in achieving satisfactory pollination levels.

Once the majority of a seed crop has reached physiological maturity, the time and method of harvest must be determined. Often this is one of the most important considerations in seed production (George, 1985). It is necessary to choose that time when economic yield potential has been achieved,

and then choose the most economical manner of collecting that yield. Following seed harvest and delivery to the warehouse, quality assurance programs are required to maintain seed genetic potential and assure grower satisfaction. The interaction and cooperation of all the departments within a seed company are required to constantly monitor seed quality to ensure a continuous supply of high-quality products.

The importance of the moisture status of seeds has long been recognized in regard to storage-life considerations, but only more recently have its effects on emergence been studied. Early work (Pollock, 1969) produced evidence of membrane damage and solute leakage during low-temperature imbibition of *Phaseolus lunatus*. The findings of more recent work presented in this workshop indicate that imbibitional injury influences seedling emergence force, and that the hard-seeded tendency of legumes may affect seed hydration rate and imbibitional injury.

Another relatively recent research thrust has been the investigation of the effects of postharvest osmotic seed conditioning, also referred to as priming or osmoconditioning (Bradford, 1986; Heydecker and Coolbear, 1977). By use of liquid, solid, or gelatinous media, seed moisture imbibition is osmotically regulated. Partial seed moisture imbibition permits activation of metabolic processes that precede radicle emergence and subsequently stimulate rapid, vigorous seedling emergence and development.

With environmental considerations paramount today, a number of current research efforts are directed at using beneficial microorganisms as seed protectants. A recent development in which beneficial microorganisms are allowed to proliferate during a controlled hydration period has been termed bio-priming (Callan et al., 1990) and its results are quite encouraging. The focus of this presentation is to discuss the role of the seed industry and seed researchers as they attempt to maximize seed quality and performance. This workshop, entitled "Stand Establishment as Affected by Seed Quality, Water Relations, and Seed Treatment," identifies the many steps and considerations that are required for consistent production and marketing of high-quality seeds.

Literature Cited

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