

# Cultivar Testing: Public Point of View

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One of the most important decisions a grower makes when formulating plans for planting is what cultivar to select. The experienced grower has observed the evolution of cultivars and is intensely aware of the vast improvements that have been made through plant breeding. Much of the increase in crop productivity can be attributed to the disease resistance, environmental adaptability, and increased yield potential incorporated into cultivars by public and private plant breeders.

New cultivars of numerous vegetables are released each year that need to be screened, and the superior ones introduced to the industry as expeditiously as possible. Should public-funded institutions support cultivar testing programs from which cultivar recommendations can be derived or should cultivars find their position in the marketplace based on their performance and the reputation of the seed company?

## Background

The commercial seed industry is quite young, initiated only in the past 75 years. Prior to this time, growers generally saved their own seed, and cultivars were passed from generation to generation. Development of the seed industry initiated an arena of competition from which growers have the opportunity to select. Traditionally, land-grant universities in the United States have assumed the responsibility of evaluating the numerous cultivars of a particular crop under the unique climatic conditions and using cultural practices common to the state where the university is located. Often a university has several testing sites in order to assure that the unique climatic and/or edaphic conditions of various production areas are met. An effort is made to have growers observe these trials during the growing season and the results of these trials are the basis for making recommendations. Unlike pesticide evaluation, which is also done by public institutions, data collected from cultivar trials have little legal significance. There is no need for efficacy or residue data to be collected for product registration. Cultivar testing is justified on the assumption that it hastens getting superior cultivars to the growers and prevents economic losses to growers by planting unsuitable forms.

Each state administers these trials differently, but they are generally the responsibility of an individual who oversees them in conjunction with his/her research or extension program. Cultivar trials should not be considered basic research because they are not innovative or creative, even though they often provide information that is critical to plant breeders, plant nutritionists, or extension specialists. In addition, the results of such trials are not suitable for publication in a refereed journal, unless they are summaries of many years of trials on a crop or involve additional plant breeding work. It is unfortunate, but not unusual, for a young scientist with a research appointment to get so involved in conducting cultivar trials that a research program is not developed. Thus, at the time of review for tenure, the individual's publication record is less than desirable. Some successful extension specialists and researchers do oversee the cultivar trials that augment their programs, but it does demand major time and monetary commitments. Most public plant breeding programs compare leading commercial releases to their most advanced breeding lines or hybrids.

On the other hand, administrators in some states believe that the extensive field work that must go into cultivar trials is beyond the scope of most extension programs. Similarly, an extension specialist may be criticized if involvement in cultivar trials interferes with his/her fulfillment of other assigned responsibilities. Thus, cultivar testing is felt by most university researchers and extension specialists to be professionally unrewarding. Knowledge of cultivars is, however, highly important in communicating with growers and processors since it is so basic to the overall production system.

Today, seed companies have achieved a high degree of sophistication with extensive research, plant breeding, and cultivar testing and marketing segments. They have professional staffs whose reputation depends on the cultivars they develop. It is their responsibility to assure that their companies' materials are evaluated and introduced into the various vegetable production areas. This active program by private industry makes many public institutions question their need to conduct such trials.

## Cost of cultivar evaluations

Perhaps the biggest concern to university staffs and administrators today is the cost of doing cultivar testing. A reputable testing program is highly labor-intensive and thus becomes quite expensive. Even if we were to assume that the university would bear all overhead costs (i.e., land, equipment, fertilizers, pesticides, and supervisory personnel), a conservative cost per entry in a replicated cultivar trial would be \$128.00 (Table 1). The latter would cover those costs above and beyond those services provided by the research farm or grower-cooperator.

It is not surprising that university staffs and administrators question whether it is the best use of their resources to support cultivar trials. It is often suggested that such trials should be self-supporting and not a drain on state-appropriated funds. Seed companies have been reluctant to support these trials financially because they are so numerous, and they believe that they cannot afford to support every state's program. If some universities charge entry fees and neighboring states do not, the seed companies can enter their material in the trial with no entry fee and obtain the environmental adaptability data they require. It is also argued that a completely unbiased trial may not be possible when entries are limited to those for which an entry fee has been paid. This limitation concerns individuals at public institutions because they may not be able to include promising entries because the company does not wish to pay the fee.

## Where do growers get their cultivar recommendations?

There have been no scientific surveys, to our knowledge, of what influences grower selection of new cultivars, but certainly university recommendations are not the sole source of information. Based on experience and discussions with colleagues, it is thought that the seed company salesperson is the most influential advisor to the grower on cultivars, especially if the salesperson is well-established, respected, and has done business in a territory for a few years. These individuals put out trial plantings and distribute packets of new cultivars for growers to try. These salespersons are generally knowledgeable about vegetable crops and are aware that their reputation depends on giving accurate information to growers. An unprofessional salesperson who tries to take advantage of the growers does not last long in the business.

Table 1. Costs of conducting vegetable cultivar trials.<sup>2</sup>

Technician (12-month appointment)	\$20,000
Seasonal labor (three individuals, 4 months)	9,000
Travel	1,000
Supplies	250
Computer charges	750
Publishing costs	1,000
	\$32,000
Cost/entry <sup>3</sup>	\$128.00

<sup>2</sup>Overhead cost and supervisory personnel costs not included.

<sup>3</sup>Based on 10 crops × 25 entries/crop.

Perhaps the next most influential source of information is the processing company that contracts the raw product, or the broker engaged to sell the product on the fresh market. Processors, in particular, have extensive cultivar trials so that the raw product can be processed in their plants and the quality of the finished product evaluated. These trials are professionally conducted, statistically analyzed, and used extensively by the field department in deciding what cultivars to contract for culture and in what areas.

Another significant source of information on cultivars is observation of neighbors' fields and conversations among growers "in the coffee shop". As protective as some growers try to be, there are really no secrets in the produce industry. When a cultivar is performing well or has done poorly, word soon gets around. These observations are often not substantiated by accurate yield data or multiple years of observation, but are often remarkably profound.

It is often only after these other avenues are exhausted that the results of the public institution's cultivar trial are consulted. The massive amount of data and number of entries often cause confusion for the grower and are often ignored, unless they are summarized and highlighted by extension personnel. Official variety recommendations based on several years of testing are generally so conservative and late that they are ignored by the experienced grower. Conscientious growers often use university results to corroborate information from other sources and confirm their observations.

#### **Who does the public institution's cultivar trial benefit?**

Probably the greatest benefactors of cultivar trials are the seed companies. They are given the opportunity to see their material grown under a wide diversity of environmental conditions, and they receive a large amount of performance data. The data they receive are not only for their material, but their competitors' as well. These trial results are used by the seed companies' scientists in deciding what material should be kept and by the sales staffs to promote their material that performed well. Inclusion of material in university cultivar trials also gives their entries a great deal of exposure to potential customers.

Growers and processing companies benefit also, for they are provided open access to the university trials and can observe numerous cultivars under their cultural conditions. However, usually only a

small percentage of the growers and processors attend field tours or observe cultivar trials in progress, for they are extremely busy during the period when the trials should be observed.

Perhaps the public institutions' roles in cultivar testing are important because they aid the seed companies in making decisions on what lines to keep or drop. If so, it would seem appropriate for the companies to assist in defraying the cost of conducting them.

#### **Growers are backers of cultivar trials**

When asked to rate projects at a public institution's research and demonstration station, growers will generally put cultivar trials at the top of the list. They are aware that cultivars have had a profound influence on their industry, and they want to be the first in line when something new comes out. Also, when growers contribute to voluntary or mandatory check-off funds, cultivar trials are one of the items they want conducted with the money. It is never clear whether they sincerely believe cultivar trials are all that important or whether it is the traditional thing to fund. During discussions with growers, the conversation generally begins with the weather and cultivars, but inevitably passes quickly to matters of pest control, cultural practices, and marketing. Perhaps cultivars are just a method to get the conversation started.

#### **Conclusions**

Cultivar trials are necessary, but extremely expensive, time-consuming, and currently unrewarding professionally. It is anticipated, however, that cultivar trials will be imperative to evaluate the results of biotechnological developments under field conditions. In times of reduced research and extension budgets, public institutions are going to take a hard look at whether they can justify extensive cultivar evaluation programs. Commercial cultivars must be included in the evaluation of lines in a breeding program, and a few can be included in cultural practice experiments. Without outside support, large replicated trials are difficult to justify. Observation and grower trials will probably continue to play a major role in extension programs. Regional cooperative variety trials greatly increase the amount of information derived from a trial; however, the basic cost of conducting the trial is still borne by the researcher.

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## **Cultivar Testing, a Seed Industry Perspective**

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Cultivar testing is an essential part of cultivar development programs. The main purpose is to determine the regional environmental adaptability and market fit of the new cultivars or hybrids. It is essential to know whether the items to be tested have the required disease resistance for the areas, whether they meet the needs of the industry as far as type or quality is concerned, and whether they will perform well under the environment of the region. Private research stations may not be in the immediate vicinity of the area of intended use, but adequate testing in these untested areas is still essential prior to release of new cultivars.

Various approaches are used in cultivar testing by the different seed companies. Some seed companies evaluate new cultivars only through their own research departments. In this case, samples are sent to cooperators, both public and private, and decisions are based on results obtained from cooperator trial results and the results of the breeder's own trials. Other seed companies send samples of new cultivars for testing through their sales departments to public and private cooperators with possible visits of the trials during the growing season by sales personnel. Release decisions are based on the observations of these visits plus the results of their breeders' own trials.

Several companies today have established product development departments. Their responsibility is to place advanced experimental cultivars with public and private cooperators. They closely monitor the trials to determine the feasibility of releasing the experimental lines as finished products. Product development personnel are the liaison between the sales departments and research departments in recommending whether a cultivar is to be released, evaluated further, or dropped. Some companies use all of these avenues in evaluating new breeding lines from the research departments to be considered for release. Whatever the system used by a seed company, an honest and professional evaluation must be made regarding any given experimental cultivar tested. It is not to the company's or public's best interest to have cultivars promoted that do not fit the needs of the consumer, whether the consumer be a housewife, grower, shipper, processor, or home gardener.

One of the biggest problems we have as a private company is to be assured that the trial reports and evaluations are performed by qualified individuals. These people must know the markets and give accurate and complete information on performance and market fit for any new cultivar. Because our markets are so diverse, this is sometimes difficult to do. For example, when Petoseed sends out