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## **SEED QUALITY ASSURANCE AND CONTROL**

David K. Langer<sup>1</sup>

### **What is Quality and Quality Assurance?**

Seed quality generally is defined as whatever the customer expects. This includes the seed itself, but also items associated with the seed including service, price and the seed company's reputation. Quality is a perceived value. Consequently, it may be almost as important to have a good looking seed package as it is to have a high germination percent. While "quality" is intangible, those of us in the seed industry must remember: "The customer knows quality when he sees it."

The fact that the customer knows what he wants, makes it particularly difficult for seed companies to define quality parameters. There is a basic set of standards the industry adheres to because of Federal and State Seed Laws. Where a seed company goes beyond those laws is voluntary, or more correctly, up to their customer's expectations.

### **Management Commitment**

For a company to earn a reputation for quality there must be a commitment to quality from its top management. A company's quality assurance group may report to the corporate level or to the top management of the production department. There is no preference of one reporting structure over the other as long as management's commitment to the quality effort is present. By reporting to the corporate level, it is implied that the top management of the company does have a quality commitment. If reporting is to the top production management it implies that the quality assurance group is going to be working closely with the seed production.

A good quality assurance program starts with established functions, goals/objectives, action plans, including a set of quality standards. An important aspect of quality assurance is a systematic problem solving technique including the handling of customer complaints. At first thought it is easy to overlook, but the proper handling of a customer complaint can actually be of great benefit to

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your company. If a complaint is handled quickly and to the customer's satisfaction, the vast majority of them will do business with you again. This does not mean that you have to necessarily give something to the customer to satisfy him. Often they simply want to be heard, and we need to make sure they feel like the important customer that they are.

### **Cooperative Effort**

The term "quality assurance" implies working with and supporting other areas of the company to assure quality products. It also means having a fully integrated program which deals with all areas of production and interacts with plant breeding and sales personnel. In production we are supplied performance potential from plant breeding, we then turn that potential into high quality seed in a cost efficient manner so the potential can be realized by our customers in the form of a high performance product. Working with the plant breeders can give you advance information about the inherent quality of certain parent lines. Quality Assurance also works closely with sales to keep them informed of the seed quality situation and also to get feedback on what the customer expects.

Having the quality group referred to as Quality Assurance is preferred over Quality Control. The word "control" implies that the quality group is solely responsible for quality, that they will take care of it and the employee running the conditioning equipment, for example, doesn't have to worry about seed quality.

At Pioneer, we emphasize that, quality is everybody's job. Quality Assurance supports all employees in their efforts to produce a quality product. Care must be taken in production to balance capacity and quality. High quantity production is a short term measure of success, while quality production is a long term measure of success for the entire company.

### **Quality Control Consciousness**

It is important to recognize, however, there is a compromise between what a customer wants, and what he is willing to pay for in a product. A perfect quality product, whether it is possible or not, would be cost prohibitive in our business of working with a living biological product. The cost of high quality is high. But, the cost of low quality, real or perceived, is even greater. In Quality Assurance we have to work with both sides of the issue and come up with an acceptable "happy medium" or standards. Quality Assurance is a constant advocate of quality. We need to keep working for improvement. Satisfaction with the "status quo" will not allow a company to improve itself in the marketplace. All employees must have a personal commitment. All steps of the quality assurance process along with the product quality itself must be monitored.

### Quality Standards/Criteria Format

Some example of quality standards/criteria are:

1. Seed lot philosophy - explain how lots are established and what can constitute a lot
2. Warm test - label germ on record
3. Vigor test - in-house use only
4. Seed field inspection - isolation, detasseling, shredders, off-types, cultural problems
5. Seed moisture - acceptable range; after drying, for bulk storage, for conditioned product
6. Seed size - seeds/lb, rounds in flats etc.
7. Plantability - acceptable range
8. Quality counts - monitor conditioning
9. Treatment - pesticide and colorant coverage
10. Unit weight - accurate
11. Bag checks - look at seed and package from customer's perspective
12. Discard - below quality standards

### Mission Statement and Functions/Activities

The following is one example of a Mission Statement and some of the functions/activities for a Quality Assurance program:

***Quality Assurance's mission is to provide service and support for Production, Sales and Marketing to assure high quality products.***



### **Functions/Activities**

- A. Coordinate communications, exchange of quality information and provide technical services and support to Production Operations, Sales, Marketing, Overseas Operations and Plant Breeding.

1. Preliminary preconditioning samples
2. Conditioning instructions
3. Rework instructions
4. Seed lot quality decisions
  - a. Conditioning plants responsible for seed appearance
  - b. Quality Assurance labs run quality tests
5. Seed plant inspections
6. Customer complaints
7. Certification - work with state agencies
8. Seed law compliance
9. Overseas quality and conditioning
10. Trouble shoot
11. Conditioning workshops
  - a. Equipment operation
  - b. Equipment evaluation
  - c. Procedures
12. Promote innovation and proactive decision making in seed quality
13. Communications with Sales
  - a. Production/quality presentations
  - b. Current quality status/decisions

- c. Effects of packaging changes, etc.
  - d. Planter clinics
  - e. Support for product complaints
- B. Manage Seed Quality Labs to be timely, consistent, reliable and reputable
  - 1. Proper sampling
  - 2. Germination testing with proper technique - warm test, vigor test
  - 3. Electrophoresis testing with proper technique
  - 4. Plantability testing
  - 5. Other tests - waxy, mechanical damage, TZ, AA etc.
- C. Provide documentation in the form of reports, manuals and quality standards/criteria
  - 1. Quality/production manuals, forms
  - 2. Quality standards/criteria
  - 3. Coordinate annual production report
- D. Maintain Plant Breeding's genetic potential and participate in transforming that potential into a superior product by demonstrating and encouraging a commitment to quality.
  - 1. Corn seed field inspection; work with soybean, wheat, sorghum, sunflower seed field inspection.
  - 2. Agronomics as it relates to quality
    - a. IPM
    - b. Seed handling
    - c. Genotype X environment - expression of seed quality
    - d. Drying
    - e. Work with Plant Breeders, Parent Seed and Production Research

E. Continue development and utilization of computer information data base to assure accurate data and optimum quality seed.

1. Historic conditioning data

a. Size-out/clean-out

b. Germination

c. Purity

d. Units

### Sequence of Functions/Activities

Up to this point the discussion has centered around the ideal theoretical organization of a Quality Assurance Group. Where the work is "really" done is in the technical and day-to-day operations of Quality Assurance. A fully integrated Quality Assurance program may proceed sequentially, as in the following example in respect to some of the more routine activities.

A. Planting

1. Grower selection - top-notch cooperative growers

2. Hybrid/variety placement - area of adaptation, yield

3. Isolation - set standards, meet requirements

4. Plant population - yield, seed size

5. Timing (nick) - yield, purity

B. Cultural

1. Integrated pest management - yield, quality

a. Weed control

b. Insect control

c. Disease control



## C. Pollination

1. Roguing - remove off-types
2. Detasseling - seed purity
3. Inspection - purity, standards met

## D. Harvest

1. Proper timing - harvest moisture, quality, yield
2. Proper equipment operation and cleaning - mechanical damage and purity
3. Proper drying and aeration - germination, molds, storability
4. Proper handling - mechanical damage

## E. Preliminary samples

1. Supply estimate - number of units to sell
2. Quality assessment - proactive conditioning decisions based on quality results
3. Conditioning instructions - to get proper supply and high quality

## F. Conditioning

1. Proper screens, equipment - select for supply and quality
2. Quality checks and counts - monitor quality
3. "Think" like a customer - seed appearance
4. Right amount, right product, right place, right time - total supply management
5. Treatment - proper amount and color
6. Bagging - proper packaging, appearance and weight
7. Tagging - satisfy labeling laws
8. Proper sampling - obtain representative sample



### G. Quality testing

1. Physical purity - foreign material, inert, weeds, etc.
2. Physical quality - appearance
3. Seed size - proper size for plantability, and unit weight
4. Plantability - within standards
5. Warm test - using approved methods
6. Vigor test - in-house standards must be met
7. Genetic purity - electrophoresis evaluation
8. Approval for shipment - OK lots for shipment to customers
9. Grow out - check questionable lots
10. Emergence trials - correlate with vigor testing
11. Other tests - waxy, accelerated aging, TZ, fast green, etc.

### H. Carryover

1. Proper sampling - correct number of bags probed to obtain random-representative sample
2. Germination - warm test and vigor test
3. Rework instructions - supply and quality approval

There are a lot of technical data, textbooks, articles, etc., available to document what you can expect from quality testing. There are also books, handbooks, video tapes and seminars available that can help you set up and conduct a quality program. A majority of these information sources on quality programs are "geared" toward the manufacturing industry. Some of the aspects of these programs may have application in the seed industry but many do not. Since we are working with a living biological product, the application of some manufacturing quality checks does not work very well. But, some of the program structures and basics goals can benefit the seed industry.

### **A Look Ahead**

What does the future hold, and what are some of the possible advances in the field of Quality Assurance? One of the manufacturing quality checks that may have some limited application in the seed industry is Statistical Process Control. Quality committees and "circles", while not new, may resurface as a valuable tool of input for the people working at the plant level in order for them to attain a desired commitment to quality.

Standardization of vigor tests is also needed in the industry, but adequate consistency and repeatability is doubtful to the extent it would let all companies truthfully apply vigor test score on their labels. The environment in which we live and sell our products is changing. We need to place more emphasis on our environmental quality, and we need to be prepared to take positive steps in this area before we are forced to do so by law. The future of pesticides will have a dramatic effect on seed quality.

Our customers are changing their expectations of seed companies. The customers in general will be larger and more sophisticated. They may well demand higher quality products.

The addition of value-added traits through biotechnology and plant breeding will create new challenges for us in Quality Assurance. This will create a larger number of products that need to be handled throughout the company. More products means more testing and more chance for errors. There may be "special" tests that will need to be conducted to assess the quality of these new "niche" products.

The future of Quality Assurance looks to be both challenging and rewarding. The field is in a dynamic stage with change, new challenges and many possibilities. For any company to make positive strides in the future they will need to have a good, solid Quality Assurance program that can accept, and meet these new challenges. We need to assure high quality products because "the customer knows it when he sees it".