ESTABLISHMENT OF SEED QUALITY CONTROL PROGRAMS

S. M. CICERO

Depto. de Agricultura-ESALQ/USP, C.P. 9, CEP: 13418-900 - Piracicaba, SP, Brasil.

ABSTRACT: An efficient quality control program should lead to the production of high quality seeds. Consequently, a series of technical and administrative procedures must be adopted in a way that does not compromise this objective. Considering that, in applied terms, external control becomes less important as internal control programs advance technologically, this work emphasizes the principle factors that should be considered in the implantation of a seed quality control program, such as: work groups, physical structure and procedures to initiate the program.
Key Words: work groups, physical structure, procedures to initiate the program

IMPLANTAÇÃO DE PROGRAMAS DE CONTROLE DE QUALIDADE DE SEMENTES

RESUMO: Um programa de controle de qualidade deve proporcionar a produção de sementes de alta qualidade. Para que tal objetivo seja alcançado com sucesso, e necessário a adoção de uma serie de procedimentos técnicos e administrativos, sem os quais haverá comprometimento das metas a serem atingidas. Levando-se em conta que, em termos aplicados, o controle externo perde importância na medida que avançam tecnologicamente os programas de controle interno, o presente trabalho aborda os principais fatores que devem ser considerados na implantação de um programa de controle de qualidade de sementes, tais como: equipe de trabalho, estrutura física e procedimentos para iniciar o programa.
Descritores: grupos de trabalho, estrutura física, procedimentos para iniciar o programa

INTRODUCTION

Seed lot quality comprises a series of characteristics or attributes that determine its value for sowing. Among the most relevant parameters are genetical, physical, physiological and sanitary (Marcos-Filho, 1994).

The quality of a material is determined by interpreting the sum of its characteristics that, when submitted to a stimulus, express a property. The seed industry sells live material that, as such, needs to present properties that justify its acquisition by farmers (Marcos-Filho et al., 1987).

The significance of the word control is very important. It does not only indicate the need to maintain quality “under control or dominion,” but also includes the monitoring of quality through data collection (Marcos-Filho, 1994). An efficient quality control program should lead to the production of high quality seeds. Consequently, a series of technical and administrative procedures must be adopted in a way that does not compromise this objective.

It is important to highlight that seed quality control is not synonymous with seed analysis. Seed quality control is a valuable instrument in collecting data between physiological maturity and sowing, which helps in decision making (Marcos-Filho, 1994). Eventhough it is common for companies to analyze the seeds produced, few really use the data obtained from these analyses in an adequate and efficient manner to seek seed quality control.

Various publications refer to seed quality control. Many interpret the concept of quality as being attributes to be acquired by the final product of the process with an emphasis on detecting product defects throughout the production system. Unfortunately, this concept has been adopted by many seed producing companies, who basically worry about reaching quality goals through pre-established specifications, in other words, to reach the minimum standards established by federal or state legislation (Andreoli, 1991).

Considering that, in applied terms, external control becomes less important as internal control programs advance technologically, this work aims to broach the principle factors that should be considered in the implantation of a seed quality control program. Situations adopted by seed companies are used as examples whenever possible.

FACTORS TO CONSIDER IN PROGRAM IMPLANTATION

Work groups: the importance of quality control should sensitize everyone involved in the process of seed production, since the sum each individual's work should result in the success of the enterprise. Although one's level of responsibility could be different from that of the others, an individual's portion of the work could compromise or contribute to reaching the final goals. Therefore, support personnel working in field activities, seed processing and laboratory, for example, should be suitably trained and oriented to perform the different functions as well as receive supervision from technicians capable for each situation.

Steps to implement order, a clear task structure and its control, and the liberty to admit operational error immediately are fundamentally indispensable for the assurance and agility of the program.

The ideal is for the company to have a quality control department, where independence of action, exclusivity of attribution and continual training should be conditions that exist in the formation of the group. Thus, companies that can not bear this type of investment can perfectly well count on the services of an external assessor that would take upon itself the coordination of program implantation as well as following its progress until the company is able to take over the program completely.

The quality control program should be evaluated periodically to verify if the desired goals were reached. Negative as well as positive aspects deserve the attention of the people involved, and adequate measures should be taken to correct errors and also to compensate those that applied themselves to the success of the program.

Physical structure: appropriate equipment, machines and installations encompassing all quality attributes are fundamental for the success of the quality control program and demand careful planning. When the program is implanted in a pre-existing structure (the most common situation), few or many modifications and acquisitions of more modern equipment and machines may be needed in order to improve the quality of seeds that are being produced, processed and stored.

The existing physical structure should be scrutinized in detail, as should the data obtained from the first evaluation of the quality of seeds being produced. This information will help in the decision to adjust, modify and/or acquire whatever is necessary to make implantation of the quality control program viable.

The seed analysis laboratory is the center of quality control. It is where identification of program faults is possible. Therefore, when implanting a quality control program, it is necessary to set up a well equipped laboratory at the same site as the seed production unit. In this way, the material collected can be immediately analyzed, and subsequent decisions can be made to solve problems with no lost time.

Procedures to initiate a quality control program: The program should be initiated even before sowing, in other words, with the decision of producing high quality seeds. Priority should be given to determining the causes responsible for the seed quality loss. Thus, qualitative losses due to a delay in harvesting (TABLE 1), harvesting methods and their effect on seed quality (TABLE 2), ear selection, thrashing method, corn seed quality (TABLE 3) and monitoring the drying process (TABLE 4), are examples of situations in which data collection through seed analysis could determine the causes of quality loss and consequently the action to be taken to diminish or eliminate the problems found.

Some steps to refine seed quality can be taken immediately without increasing production costs, such as machine regulation. Others could require modification or acquisition of machines or equipment, which would demand more time in function of the financial resources available. Another procedure that could be adopted soon after program implantation is that of analyzing all seed lots produced by the company in order to establish priorities for their commercialization. For this, it is necessary to choose tests that accurately indicate the principle quality attributes. In addition to the germination test, various vigor tests such as the cold test, accelerated aging, electrical conductivity, tetrazolium and emergence in the field as well as evaluation of mechanical damage are indicated to help make decisions concerning lot distribution in regions where there is a greater chance for success. The example contained in TABLE 5 illustrates the matter being discussed:

TABLE 1 - Corn seed maintenance and harvesting period: effects of water content (W); germination (G); vigor, evaluated by accelerated aging (AA) and seeds infested by insects (IS) (Cicero et al., 1981).

Harvesting Period	W (%)	G (%)	AA (%)	IS (%)
30 days after pollination	49.4	84	87	0.0
At physiological maturity (P.M.)	36.3	98	96	0.5
2 weeks after P.M.	25.9	94	93	8.0
4 weeks after P.M.	18.3	96	96	6.5
6 weeks after P.M.	14.5	91	89	11.5
10 weeks after P.M.	13.9	92	90	16.0
12 weeks after P.M.	14.1	70	72	31.5
14 weeks after P.M.	13.8	70	72	38.0
16 weeks after P.M.	12.5	75	76	33.5

TABLE 2 - Corn seed harvesting methods (manual – MAN, mechanical – MEC and collection of fallen ears – CFE): effects on germination (G) and vigor, evaluated by accelerated aging (AA) and cold test (CT) (Toledo et al., 1988).

	Beginning of storage			After 12 months storage		
Parameters Evaluated	MAN	MEC	CFE	MAN	MEC	CFE
G (%)	98	93	94	90	83	77
AA (%)	98	93	91	67	54	50
CT (%)	96	90	90	50	56	41

TABLE 3 - Effects of ear selection and thrashing on physical and physiological quality of corn seeds: mechanical damage (MD), germination (G), cold test (CT), accelerated aging (AA) and electrical conductivity (EC) (Sato, 1991).

Treatments[1]	MD (%)	G (%)	CT (%)	AA (%)	EC[2]
MC.T./F W/ E.SEL	15.0 C[3]	85 B	84 B	85 C	9.5 B
MC.T./SBM W/ E.SEL	11.0 BC	91 B	91 AB	89 BC	6.2 A
MC.T/SBM/E.SEL	3.5 AB	98 A	95 A	94 AB	6.0 A
MC.T/F/E.SEL	5.5 ABC	87 B	87 B	85 C	9.6 B
MA.T/E.SEL	0.0 A	98 A	97 A	96 A	6.1 A
MA.T W/ E.SEL	3.0 AB	91 B	84 B	84 C	5.8 A

[1]MC: mechanical; MA: manual; T: thrashing; F: field; SBM: seed benefiting mill
W/: without; E: ear; SEL: selection
[2]µmhos/cm/g
[3]means in a column followed by the same letter are not significantly different by the Tukey test at a 5% probability level.

TABLE 4 - Monitoring continuous motion dryer during the drying of corn seeds (Cicero, 1994).

Nº of Drying Cycles	Seed Moisture (%)				
	Lot A	Lot B	Lot C	Lot D	Lot E
Beginning	20.0	12.3	18.0	16.4	14.6
1	16.0	12.3	16.6	13.8	12.7
2	15.5	11.4[1]	15.8	12.5	11.8[1]
3	13.9	11.1	14.9	11.7[1]	10.5
4	10.5[1]	11.5	13.8	11.8	10.3
5	11.3	11.3	13.0	11.8	-
6	11.7	11.1	12.4	10.7	-
7	11.6	-	12.1[1]	9.9	-
8	11.1	-	12.0	-	-

[1]Moment at which drying should have been interrupted.

TABLE 5 - Physiological quality of 40 corn seed lots of cv FO 01: frequency (%) of lot germination and vigor (accelerated aging, cold test and emergence in the field) greater than 94%, between 90% and 94%, between 85% and 89% and less than 85% (Cicero, 1994).

Parameters Evaluated	> 94%	90 - 94%	85 - 89%	< 85%
Germination	57.5[1]	40.0	2.5	0
Accelerated Aging	50.0	40.0	10.0	0
Cold Test	50.0	42.5	7.5	0
Emergence in the Field	65.0	35.0	0	0

[1]Frequency (%) of lots observed.

commercialization of corn seed lots that presented seedling emergence greater than 94% in the cold test (50% of the total lots produced by the company in discussion) could be safely commercialized in the regions subject to periods of low temperatures during sowing seasons, which is relatively common in the southern region of Brazil.

FINAL CONSIDERATIONS

Implantation of a seed quality control program demands correctly understanding the proposed objectives, available financial resources and the implementation methods.

It is not possible to stipulate a rigid schedule for program implantation, since it is necessary to study and project each situation. Therefore, establishment of goals to be achieved should receive special attention, as should the sequence of steps to be taken to achieve the objectives in the quickest, surest way.

After implanting the program and solving the main problems compromising seed quality, program maintenance should be facilitated by the structure already installed and by the properly trained and qualified personnel.

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