SEED ENTERPRISE MANAGEMENT INSTITUTE (SEMIs)

National Plant Protection organizations (NPPOs) and Seed Quality Regulators Course

16th – 21st January 2017

Overview of Seed Quality Assurance Systems



Prof. James W. Muthomi
Department of Plant Science and Crop Protection
University of Nairobi

Importance of quality assurance in seed trade

* High-quality seed is a pre-requisite to achieve maximum crop productivity & good returns
* To strengthen the seed sector through adherence to policies that guarantee quality standards and regulatory features.
* International organizations, conventions & treaties provide an international regulatory framework to oversee interests of breeders, producers and consumers
* Appropriate regulatory framework promotes competitive seed markets & lowers barriers to trade

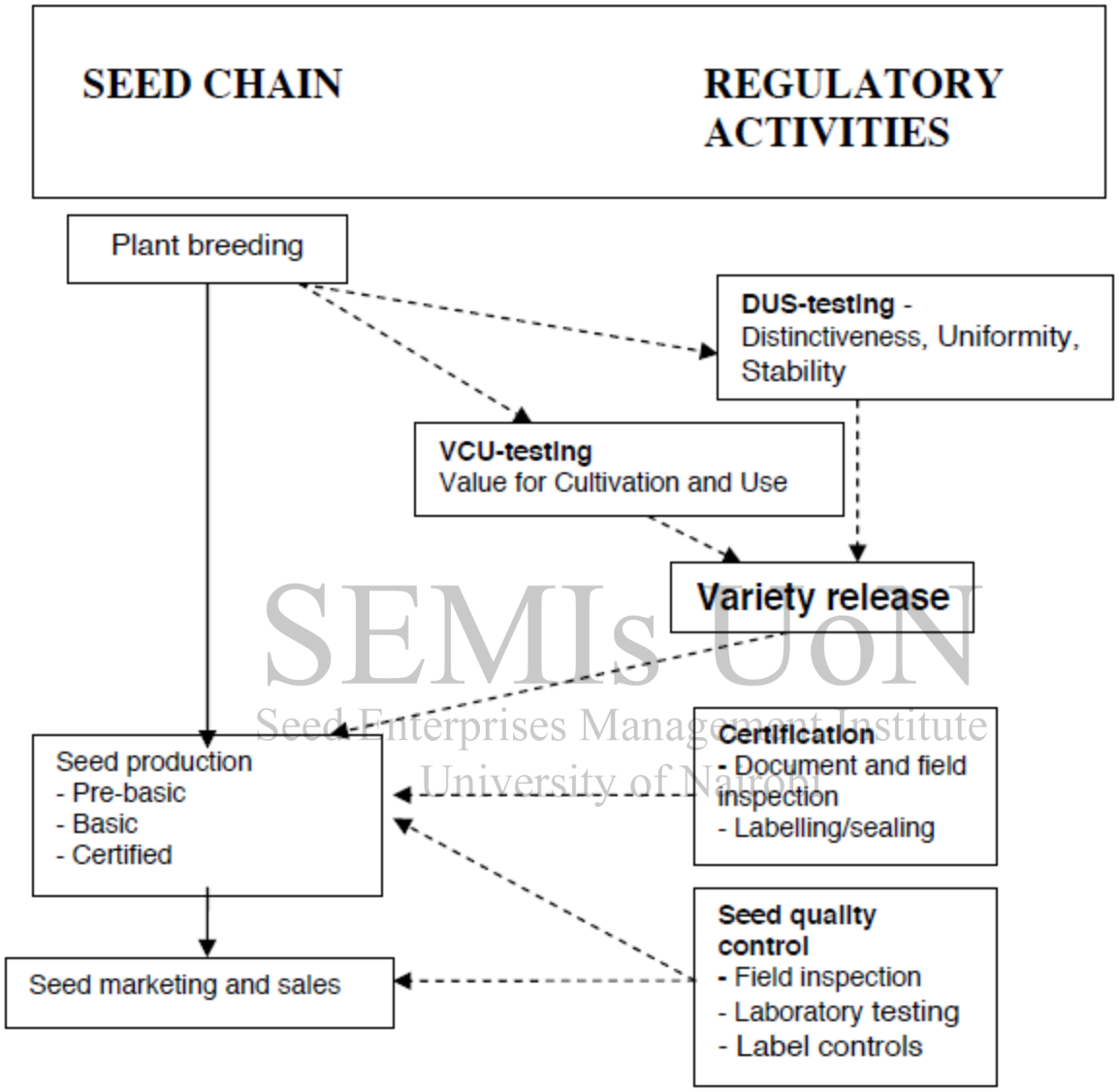

Figure 3.1 Schematic representation of the seed chain (left) and the regulatory functions (right hand side), (this study)

International Organizations, Conventions & Treaties Regulating Seed Trade

* Organization for Economic Co-operation and Development (OECD),
* International Seed Testing Association (ISTA)
* International Union for the Protection of New Varieties of Plants (UPOV)
* International Seed Federation (ISF)
* Food and Agriculture Organization of the United Nations (FAO)

Aspects of seed quality assurance

* Seed certification systems
* Seed testing
* phytosanitary measures
* Plant variety protection
* Capacity building

Seed certification systems

Seed is controlled & inspected to guarantee consistent high quality for consumers, by:

* controlling the seed in previous generations;
* carrying out field inspections to ensure there is little contamination & that the variety is true to type;
* growing samples in control plots of the known seed to ensure the progeny conform to characteristics of the variety
* seed quality testing in laboratories.

Seed certification bodies

* The OECD Seed Schemes provide an international framework for the certification of seed
* Association of Official Seed Certifying Agencies (AOSCA),
* EU Directives.
* regional economic communities such as Southern African Development Community (SADC), the Economic Community of West African States (ECOWAS) & the Communaute Economique et Monetaire de l"Afrique Centrale (CEMAC)

Seed testing

* Seed tests provide farmers, seed traders and regulators with information on the quality of seed before it is sown
* Quality attributes tested:

i. minimum physical purity
ii. Minimum germination
iii. limits on moisture contents
iv. limits on seed-borne diseases
v. Other quality aspects evaluated - seed size and weight, seed vigour, seed viability and varietal quality assessment, including detection of genetically modified organisms

International Seed Testing Association (ISTA)

* Develop and issue standard procedures for seed sampling and testing & to promote a uniform application of procedures for evaluation of seed intended for the market.
* Activities: i) publication of International Rules for Seed Testing, ii) laboratory accreditation system, iii) the ISTA international certificates, iv) dissemination of knowledge in seed science & technology.

* Other organizations:

i. The Association of Official Seed Analysts (AOSA) - United States and Canada
ii. The Society of Commercial Seed Technologists - commercial, independent & government seed technologists

Phytosanitary measures

* Phytosanitary measures are government legislations, regulations & procedures that regulate, restrict or prevent the import and marketing of certain plant species or plant products
* Aim - to prevent the introduction and spread of plant pests across international boundaries or to limit the economic impact of regulated non-quarantine pests
* Agreement on the Application of Sanitary and Phytosanitary Measures (WTO-SPS Agreement) of the World Trade Organization (WTO),
* Harmonization of phytosanitary regulations - the International Plant Protection Convention (IPPC) is recognized by the WTO-SPS Agreement as the only international standard setting body for plant health

Plant variety protection

* The International Union for the Protection of New Varieties of Plants (UPOV) - intergovernmental organization to provide and promote an effective system of plant variety protection with the aim of encouraging the development of new varieties of plants for the benefit of society
* UPOV Convention encourages plant breeding by granting breeders of new plant varieties an intellectual property right: the breeder's right.
* The breeder's right is only granted where the variety is:

i) new;

ii) distinct from existing, commonly known varieties;

iii) uniform;

iv) stable and has suitable denomination.

Capacity building at the international level

FAO provides assistance to its Member states in seed policy and legislation development & capacity building in the following ways:

* National seed policy:
* Regional harmonization of seed regulations
* Seed production and quality assurance
* Quality Declared Seed

Seed Standards

FIELD AND LABORATORY STANDARDS

A. FIELD STANDARDS

Species	*Isolational, Meters (Minimum)*					*Off-types of other Cultivars*				
Cereals	BR	PB	B	CL	C2-C4	BR	BR	BI	CI	C2-C
						Maximum Number per 100 Plants (Heads)				
*Maize	400	400	400	200	200	0	0	0	1	2
*Soghum	400	400	400	200	200	0	0	0	1	2
						Maximum Number per 100 Square Metres				
Wheat	10	10	10	4	4	1	1	1	5	6
Barley	10	10	10	4	4	1	1	1	5	6
Triticale	50	50	50	20	20	1	1	1	5	6
Oats	10	10	10	4	4	1	1	1	5	6
Finger Millet	10	10	10	4	4	1	1	1	5	6
Pulses						*Maximum Number per 100 Plants*				
Beans	50	50	50	25	25	0	0	0	1	2
*Broad Beans	200	200	200	100	100	0	0	0	1	2
Soya Beans	10	10	10	4	4	0	0	0	1	2
Cowpeas	50	50	50	25	25	0	0	0	0	0
Pea	50	50	50	25	25	0	0	0	1	2
Oil Crops						*Maximum Number per 100 Plants*				
†Sunflower	4,000	4,000	4,000	1,000	1,000	2m. 5f.	2m. 5f.	2m. 5f.	5m. 10f.	5m. 10f.

ADITITIONAL FIELD STANDARDS

1. The seed inspector may reject a crop should it be excessively weedy or severely lodged
2. Inspection shall be done for the following diseases.

	Crop	*Disease*	*Tolerance*
(a)	Maize	Headsmut (Sphaceiotheca reiliana (Kuhn) Clint)	2 plants per hectare
	†	Loose smut (Ustilago maydis (DC) Corda	2 plants per hectare
(b)	Wheat Oat Barley Triticale	Bunt (Tilletia Foetida (Waiir. Liro)	1 head per 100 sq. m
		Loose smut (Ustilago spp.)	1 head per 100 sq. m.
	†	Covered smut (Ustilago hordei (pers.) Lagerh)	1 head per 100 sq. m.
(c)	Sorghum	Bunt	1 plant per 1,000 plants
		Mildew	1 plant per 1,000 plants
(d)	Beans	Halo blight (Pseudomonas phaseolicola)	None during final inspection
	†	Anthracnose (collectotrichum	

KEY:

† No roguing
‡ Roguing is notifiable
§ No roguing on disease

(e)	Peas & Cowpeas	Leaf spots (Ascochyta spp)	None during final inspection
		Pod spots (Mycosphaerella pinodes)	None during final inspection
		Bacterial blight (Xanthomonas vignicola)	None during final inspection

KEY:

† No roguing
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§ No roguing on disease

NATIONAL SEED QUALITY CONTROL SERVICE

FINAL FIELD INSPECTION

Growers Name ..... and No. .....
Species ..... Variety ..... Crop No. .....
Class ..... hectares .....

Factor	*1st. Inspection*	*2nd Inspection*	*3rd Inspection*	*Total No. or %*
Off-types				
Diseases				
Tassels				
Weeds				
Other Crops				
Others (Specify)				

Remarks
.....
.....
.....

This crop is approved/rejected.

Date ..... Signature .....

Director, N.S.Q.C.S.

C. Laboratory Standards

1. Quality requirements with respect to analysis figures concerning purity, germination capacity, other crop seed, weed seed and moisture content.

Species	*Minimum Parity % by weight*	*Maximum other Crops seed % by number*	*Maximum Weed seeds % by weight*	*Minumum Germination Capacity %*	*Maximum Moisture Content %*
CEREALS					
Maize	99	trace	trace	90	13
Wheat	99	trace	0·1	85	13
Barley	99	trace	0·1	90	13
Sorghum	95	1	1	70	11
Millet	95	1	1	70	11
Oats	99	trace	0·1	85	13
Triticale	99	1	0·1	80	13
Rye	99	trace	0·1	85	13
Rice	99	1	1	70	11
PULSES					
Beans	99	trace	0.1	80	15
Broadbeans	99	trace	0.1	80	15
Chickpeas	99	0.1	0.5	75	15
Cluster beans	98	0.1	0.5	75	15
Cowpea	98	0.1	0.3	80	12
Dolichos bean	99	trace	0.1	80	15
Pea (garden)	98	0.1	0.3	80	12
Pigeon peas	98	0.1	0.3	80	12
Common vetch	93	trace	0.1	70	14
French beans	99	trace	0.1	80	15
Sugar peas	98	0.1	0.3	75	12

SEED CLASSES

(r. 9 (2))

Code	*Classes*	*Seed Parents*	*Colour of Labels*
Br.	Breeder	Progeny of parental stock	White
Pb.	Pre-basic	Progeny of parental stock or certified breeders seed	White
B.	Basic	Progeny certified breeders seed or certified pre-basic seed	White
C.1	Cer. 1st gen.	Progeny of certified pre-basic seed or certified basic seed	Blue
C.2	Cert. 2nd gen.	Progeny of certified basic seed or certified 1st generation	Pink
C.3	Cer. 3rd gen.	Progeny of certified 1st generation or certified 2nd generation	Pink
C.4	Cer. 4th gen.	Progeny of certified 2nd generation or certified 3rd generation	Pink
Std. Seed	Standard Seed	Only used when a serious shortage of seed (for certification) of essential crops occurs	Grey

Note: (i) Potatoes-stock seed (SS), Pre-basic, basic, CI, CII, CIII.

(ii) Hybrid Maize-Breeders seed, Pre-basic, basic cert. I.

(All cases of hybrids).

Maize OPV, *Zea mays* **L**

COMESA Standards

Field Standards	Basic Seed	Certified 1st
Minimum previous cropping season	1*	1*
Isolation (m)	400**	200**
Maximum off-types (%)	0.1	0.5
Minimum number of inspections	3	3
Diseases		
Sphacelotheca reiliana Head smut (at final inspection)	0	0
Ustilago zeae Common smut (at final inspection)	0	0
Sporisorium cruentum Loose smut (at final inspection)	0	0
Laboratory Standards		
Minimum germination (%)	90	90
Minimum pure seed (%)	99	99
Maximum moisture (%)	13	13

*Not required if volunteer plants are removed through irrigation/rainfall.

**Time isolation may replace distance isolation. Rows of male plants can reduce distance isolation.

Seed Quality Assurance Systems

Maize Hybrid Field Standards

Field Standards	Basic Seed	Certified 1st
Minimum previous cropping season	1*	1*
Isolation (m)	400**	200**
Maximum off-types (%)	0.1***	0.2****
Minimum number of inspections	3	3
Diseases		
Sphacelotheca reiliana Head smut (at final inspection)	0	0
Ustilago zeae Common smut (at final inspection)	0	0
Sporisorium cruentum Loose smut (at final inspection)	0	0
Laboratory Standards		
Minimum germination (%)	80	90
Minimum pure seed (%)	99	99
Maximum moisture (%)	13	13

*Not required if volunteer plants are removed through irrigation /rainfall.

**Time isolation may replace distance isolation. Rows of male plants can reduce distance isolation.

*** The number of female parent plants that have either shed pollen or are shedding pollen exceeds 0.5 percent at any one inspection, or the total number of female parent plants that have either shed pollen or are shedding pollen exceeds 1 per cent for the three inspections carried out on different dates.

****The number of female parent plants that have either shed pollen or are shedding pollen exceeds 1 percent at any one inspection, or the total number of female parent plants exceeds 2 per cent at three inspections carried out on different dates.

COMESA SEED CERTIFICATION STANDARDS

Beans, *Phaseolus vulgaris* **L**

Field Standards	Basic Seed	Certified 1st
Minimum previous cropping season	1	1
Isolation (m)	10	5
Maximum off-types (m^2)	1/30 m^2	1/10 m^2
Minimum number of inspections	3	3
Diseases		
Bean common mosaic virus %	0	0.1
Collectotrichum lindeuthianum Anthracnose of bean %	0.02	0.02
Pseudomonas phaseolicola Halo blight %	0	0.05
Pseudomonas syringae pv.syringae Bacterial canker	0	0.05
Phaeoisariopsis griseola Angular bean leaf spot	0.02	0.05
Xanthomonas phaseoli Bacterial blight of bean	0	0.05
Laboratory Standards		
Minimum germination (%)	75	80
Minimum pure seed (%)	99	99
Maximum moisture (%)	14	14

COMESA LABEL COLOUR

Pre-basic seed (Violet band on white)
Basic seed (White)
First generation Certified seed (Blue)
Second generation certified seed (Red)


THANK YOU FOR THE
AUDIENCE