



## Session 4 – The importance of quality seed in agriculture

---

# The influence of seed quality on crop productivity

**Mrs. Rita Zecchinelli**



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



## **CROP PRODUCTIVITY**

*Satisfactory results are reflected in a high yield of valuable products, resulting in economical profits*



**Many factors may affect the output of the cultivation:**

- environmental conditions
- soil characteristics
- watering
- fertilization, treatments
- tillage
- farmer
- local and global market
- others



**The seed is the first determinant of the future plant development. The seed is the master key to success with the cultivation.**





# SEED QUALITY FACTORS AFFECTING CROP PRODUCTIVITY:

- genetic characteristics
- yield
- market quality
- storability





*Genetic characteristics*

**Benefits from the breeding can only be transferred to the farmer if good quality seed is released**





INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



**Farmer's expectations can only be achieved if the seed is true to the selected variety**



## **SEED SECURITY:**

**availability of the appropriate variety at the right place and time, in sufficient quantity and quality**



## **VARIETY TESTING:**

**may be aimed to identify the variety, to discriminate different varieties, to check the genetic purity (SEED TRADE, CERTIFICATION SCHEMES) or to provide a characterization of the variety (NEW VARIETIES)**



***Crop yield***

**Germination capability, seed vigour: master key to achieve**

- rapid germination
- good emergence
- appropriate plant population



Maize  
(Italy)



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



Maize  
(South Africa)



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



Sunflower  
(South Africa)

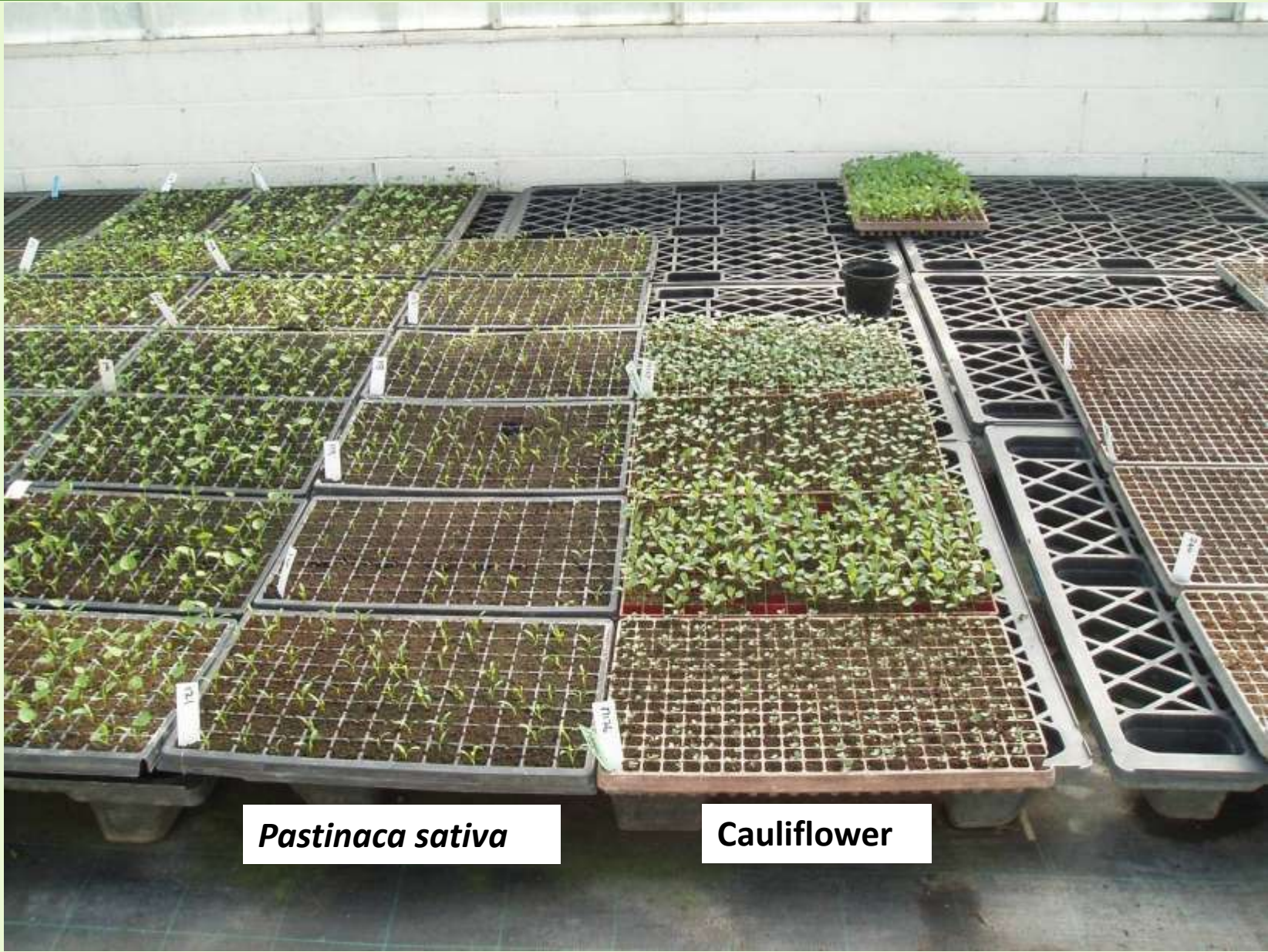


INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



Groundnuts  
(South Africa)



*Pastinaca sativa*

Cauliflower



Species	Sample	Laboratory germination (%)	CD germination (%)	MET (days)	Final emergence (%)	Plant height (1 <sup>st</sup> leaf stage)	Coefficient of variation of plant height
Cauliflower	1	98	99	4,4 (4)	92	26,7	21,5
	2	90	37	6,2 (14)	88	19,8	25,9
Brussels sprouts	1	98	100	4,2 (3)	100	30,8	23,9
	2	100	57	4,7(3)	50	27,2	19,7
Dutch cabbage	1	98	95	4,4 (4)	98	21,8	27,0
	2	93	66	5,3 (6)	92	18,2	36,9
Red cabbage	1	97	97	4,6 (5)	98	25,6	22,1
	2	85	32	5,7 (7)	100	16,8	32,5
Calabrese	1	99	100	4,1 (9)	96	21,0	14,7
	2	93	54	4,1 (13)	92	21,0	20,5



## A noxious weed infestation reduces the yield



Weed infestation field-bean (Italy)



*Fusarium* in wheat



*Fusarium* in rice



*Sclerotinia* in legumes

**Seed-borne diseases:**  
**-reduction of the yield**  
**-introduction of new pathogens**  
**-spread of dangerous pests**



*Plasmopara* in sunflower



*Ustilago* in barley



*Ustilago* in wheat



*Tilletia* in wheat



Wheat (Italy)



**Containment in the use of chemicals:**

- organic farming
- low availability/high costs

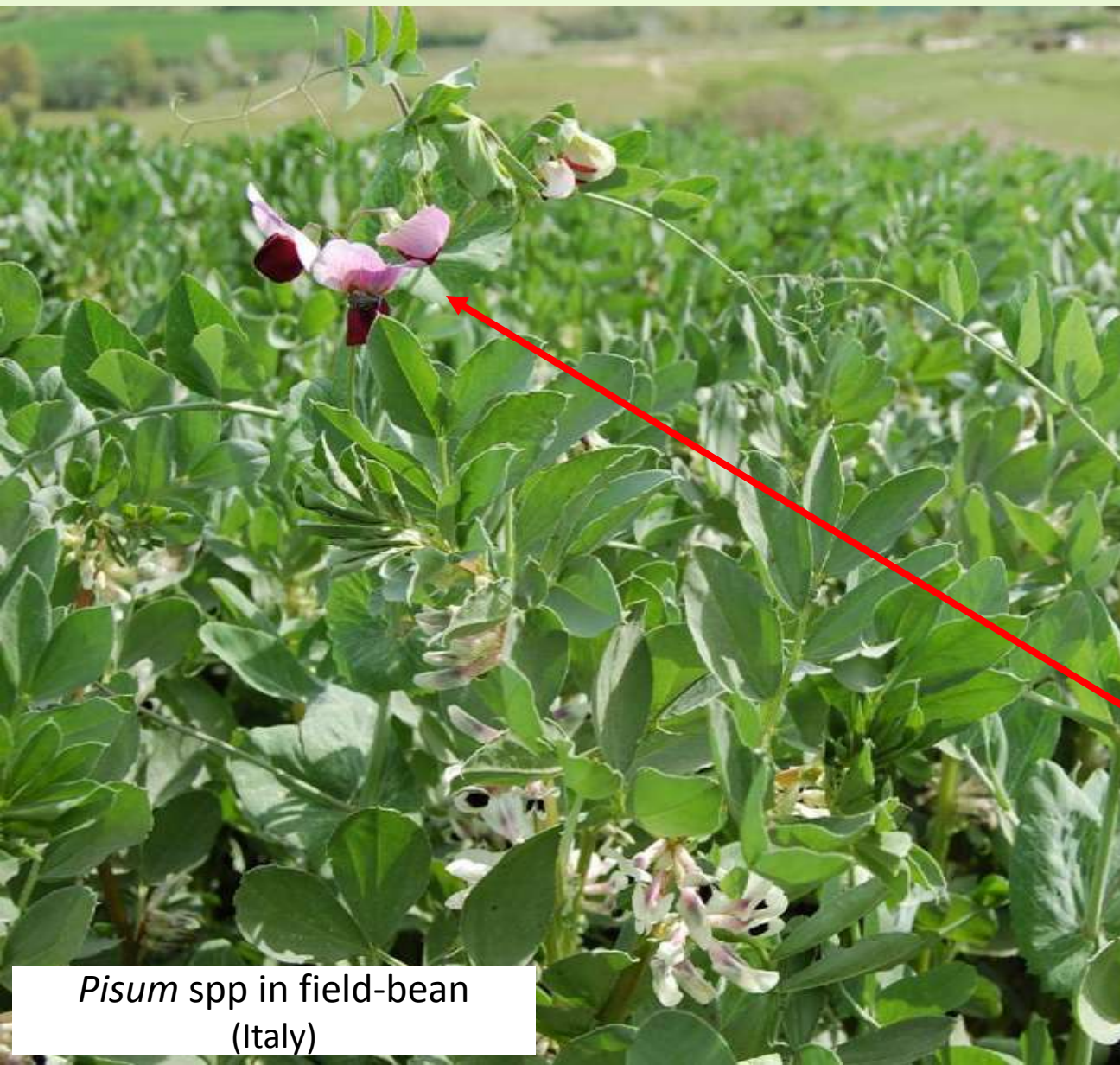


Sunflower (Hungary)



## Seed quality standard

- germination
- physical purity
- other seed determination



*Pisum* spp in field-bean  
(Italy)





Sample of  
*Trifolium resupinatum*

*Cuscuta* spp.



*Cuscuta*  
infestation  
Persian clover  
(Italy)





Orobanche in field-bean  
(Italy)



Orobanche in sunflower  
(Hungary)



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



Sample of  
*Trifolium  
incarnatum*

*Melilotus* spp.



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



*Melilotus*  
infestation

Crimson clover  
(Italy)



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



*Quality of the products of the cultivation*

## **Marketable quality affects the productivity**

- intrinsic features of species/variety
- health conditions of the product (symptoms)
- uniformity of the product (size, stage)



Soft wheat in durum wheat  
(Italy)

*Triticum durum*

*Triticum aestivum*





***Xanthomonas campestris* in pepper**



*Fusarium* spp. in wheat



INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

[www.seedtest.org](http://www.seedtest.org)



Lettuce  
(New Zealand)



## ***Seed storage***

### **Seed storability depends on:**

- storage conditions (humidity, temperature)
- moisture content of the seed
- initial quality of the seed

### **Poor storage conditions:**

- the seed loses the ability to germinate

### **Low moisture content of the seed:**

- negative for recalcitrant seeds
- positive for orthodox seeds

### **Initial quality of the seed:**

- as lower it is, as quicker the loss of viability





**Moisture content is one of the parameters taken into account to determine the market value of seeds**





COUNCIL DIRECTIVE 2002/57/EC

of 13 June 2002

on the marketing of seed of oil and fibre plants

L 193/74 EN Official Journal of the European Communities 20.7.2002

**COUNCIL DIRECTIVE 2002/57/EC**  
of 13 June 2002  
on the marketing of seed of oil and fibre plants

THE COUNCIL OF THE EUROPEAN UNION,

Having regard to the Treaty establishing the European Community, and in particular Article 17 thereof;

Having regard to the proposal from the Commission;

Having regard to the Opinion of the European Parliament (1);

Having consulted the Economic and Social Committee;

Whereas

(1) Council Directive 66/216/EEC of 30 June 1969 on the marketing of seed of oil and fibre plants (2) has been repeatedly and substantially amended (3). For reasons of clarity and uniformity the said Directive should be recast.

(2) The production of oil and fibre plants occupies an important place in the agriculture of the Community.

(3) Satisfactory results in the cultivation of oil and fibre plants depend to a large extent on the use of appropriate seed.

(4) Greater productivity will be achieved in the cultivation of oil and fibre plants within the Community if for the choice of the varieties permitted to be marketed the Member States apply uniform rules which are as strict as possible. A common catalogue of varieties of agricultural plant species is therefore provided in the Council Directive 2002/53/EC (4).

(5) It is desirable to establish a uniform certification scheme for the Community based on the experience gained in the application of schemes in the Member States and those of the Organisation for Economic Co-operation and Development. In the context of the consolidation of the internal market, the Community scheme should cover the production of seed with a view to marketing and to marketing within the Community, and should offer no possibilities for the Member States to derogate unilaterally from the scheme in a way that would hinder the improvement of seed within the Community.

(6) As a general rule, seed of oil and fibre plants should be allowed to be marketed only if it has been officially examined and certified, in accordance with the rules for certification, as basic seed or certified seed. The choice of the national terms 'basic seed' and 'certified seed' is based on already existing international terminology. It should be possible under specific conditions to place on the market seed of guarantee type or basic seed and seed as grown.

(7) Community rules should not apply to seed shown to be intended for export to third countries.

(8) In order to improve not only the genetic quality of Community seed of oil and fibre plants but also its external characteristics, certain requirements should be laid down as to analytical purity and germination.

(9) In order to ensure the identity of the seed, Community rules on packaging, sampling, sealing and marking must be established. To this end the labels should give the particulars required both for official verification and for the information of the user and should clearly show the Community name and the certification of the certified seed of the various categories.

(10) Rules for the marketing of chemically treated seed, seeds suitable for sowing, growing or used as for the conservation by use in situ of varieties threatened with genetic erosion, should be introduced.

(11) Derogations must be permitted under certain conditions, without prejudice to the provisions of Article 14 of the Treaty, Member States making use of the derogations must mutually assist each other as regards inspection.

(12) In order to ensure that both the requirements as to the quality of the seed and the provisions for ensuring its identity are complied with during marketing, Member States must make provision for appropriate control arrangements.

(1) Opinion adopted on 9 April 2002 has yet published in the Official Journal.

(2) OJ L 109, 10.7.1969, p. 1. Directive as last amended by Directive 2002/53/EC (OJ L 23, 1.2.1999, p. 27).

(3) See Annex V, part A.

(4) See page 1 of the Official Journal.

(3) Satisfactory results in the cultivation of oil and fibre plants depend to a large extent on the use of appropriate seed.

**Unified system to provide the user with good quality seed in respect of:**

- varietal identity and purity
- germination capability
- specific purity
- seed health



C(2000)146/FINAL incl. 2003, 2004, 2005, 2006, 2007 & 2008 amendments  
OECD SEED SCHEMES - January 2009

## ANNEX I TO THE DECISION

### BASIC PRINCIPLES

1. The objective of the OECD Schemes for the varietal certification of seed is to encourage the use of seed of consistently high quality in participating countries. The Schemes authorise the use of labels and certificates for seed produced and processed for international trade according to agreed principles.



OECD Schemes  
for the Varietal Certification or the Control of Seed  
Moving in International Trade

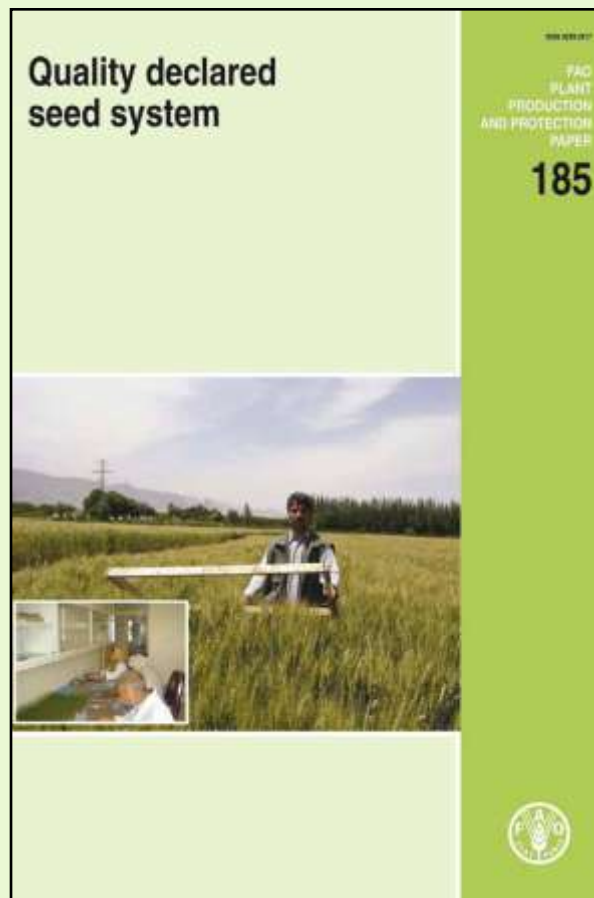
## OECD SEED SCHEMES "2009"

as revised by the OECD Council  
on 28 September 2000  
*[C(2000)146/FINAL]*

and subsequently amended  
*[C(2007)122, C(2007)123, C(2007)128,  
C(2008)150, C(2008)151, C(2008)152 and C(2008)153]*

**57 countries participate to the schemes for varietal certification (6 schemes—agricultural species) or control (1 scheme-vegetables) of seed moving in International trade.**

**Each scheme provides a set of rules and directions aimed at the assessment of seed quality, based on agreed principles.**



FAO recognizes the pivotal role of seeds in agricultural development. Increasing the quality of seeds can increase the yield potential of the crop and is one of the most economical and efficient inputs to improve crop production and productivity. The FAO/





## ACKNOWLEDGEMENTS

Alison Powell (United Kingdom)  
Alessandra Sommovigo (Italy)  
Pamela Strauss (South Africa)  
Fabio Ferrari (Italy)  
Katalin Ertsey (Hungary)  
Martin Luis Vassallo (Spain)  
Ilaria Alberti (Italy)  
Theresia A.S. Aveling (South Africa)  
Romana Bravi (Italy)  
Manuel Chavez (Mexico)  
Giovanni Corsi (Italy)  
Eddie Goldschagg (South Africa)  
Mario Leandri (Italy)  
Masatoshi Sato (Japan)  
Luigi Tamborini (Italy)

***Thank you!***