Session 4 – The importance of quality seed in agriculture

The influence of seed quality on crop productivity

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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

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

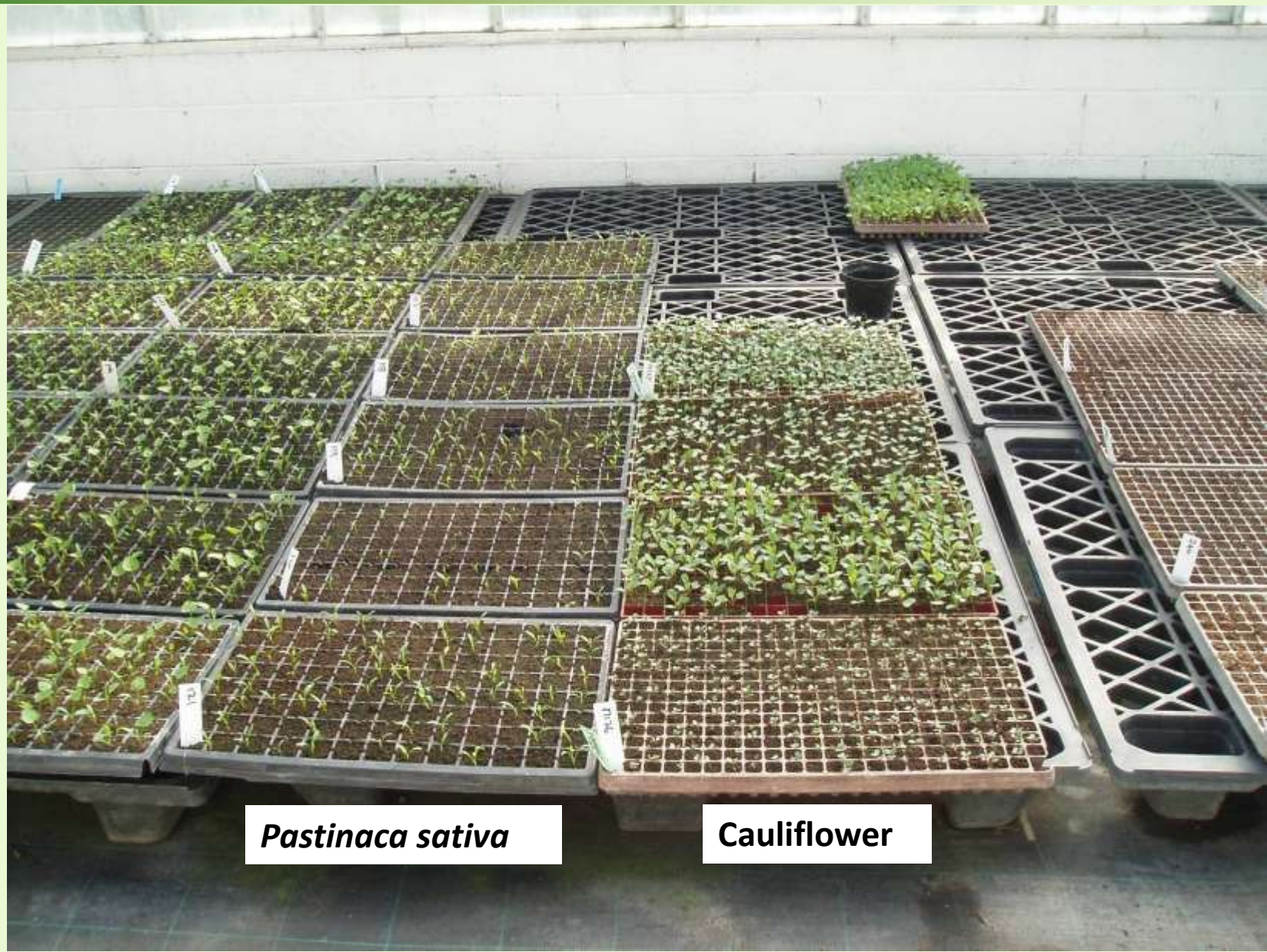
- **rapid germination**
- **good emergence**
- **appropriate plant population**

Maize
(Italy)

Maize
(South Africa)

Sunflower
(South Africa)

Groundnuts
(South Africa)



Vegetables

Species	Sample	Laboratory germination (%)	CD germination (%)	MET (days)	Final emergence (%)	Plant height (1st 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

Table modified from Powell et al, 1991

A noxious weed infestation reduces the yield

Weed infestation field-bean (Italy)

Seed-borne diseases:

-reduction of the yield
-introduction of new pathogens
-spread of dangerous pests

Fusarium **in wheat** ***Fusarium*** **in rice** ***Sclerotinia*** **in legumes**

Plasmopara **in sunflower** ***Ustilago*** **in barley** ***Ustilago*** **in wheat** ***Tilletia*** **in wheat**

Wheat (Italy)

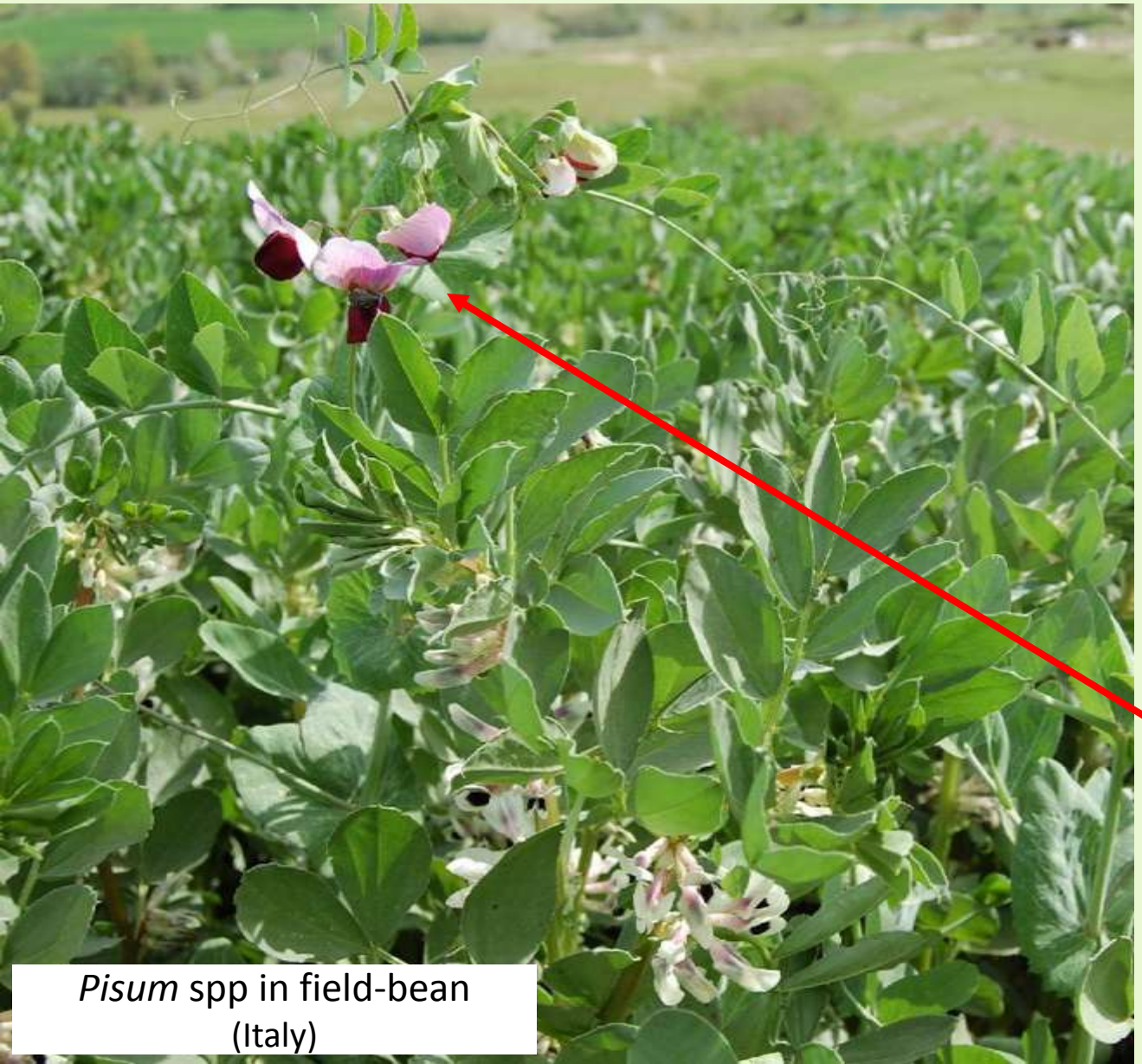
Containment in the use of chemicals:

- **organic farming**
- **low availability/high costs**

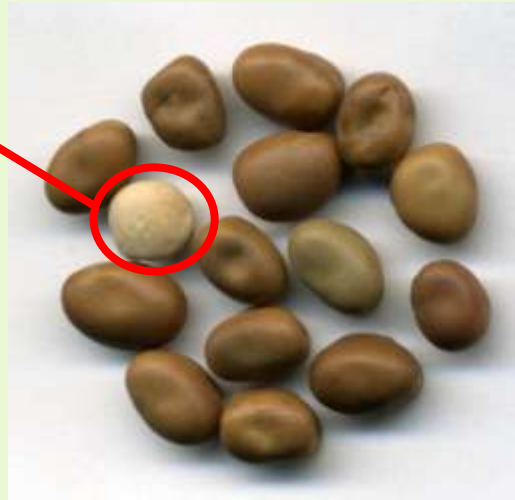
Sunflower (Hungary)

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 sunflower
(Hungary)

Orobanche in field-bean
(Italy)

Orobanche hederae (http://www.ars-grin.gov/npgs/images/sbml/Orobanche_hederae_seeds.jpg)

Sample of *Trifolium incarnatum*

Melilotus spp.

Melilotus infestation Crimson clover (Italy)

Quality of the products of the cultivation

Marketable quality affects the productivity

- intrinsic futures 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**

Photo from the Internet: www.ces.ncsu.edu/.../bspepfr2.jpg

***Fusarium* spp. in wheat**

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

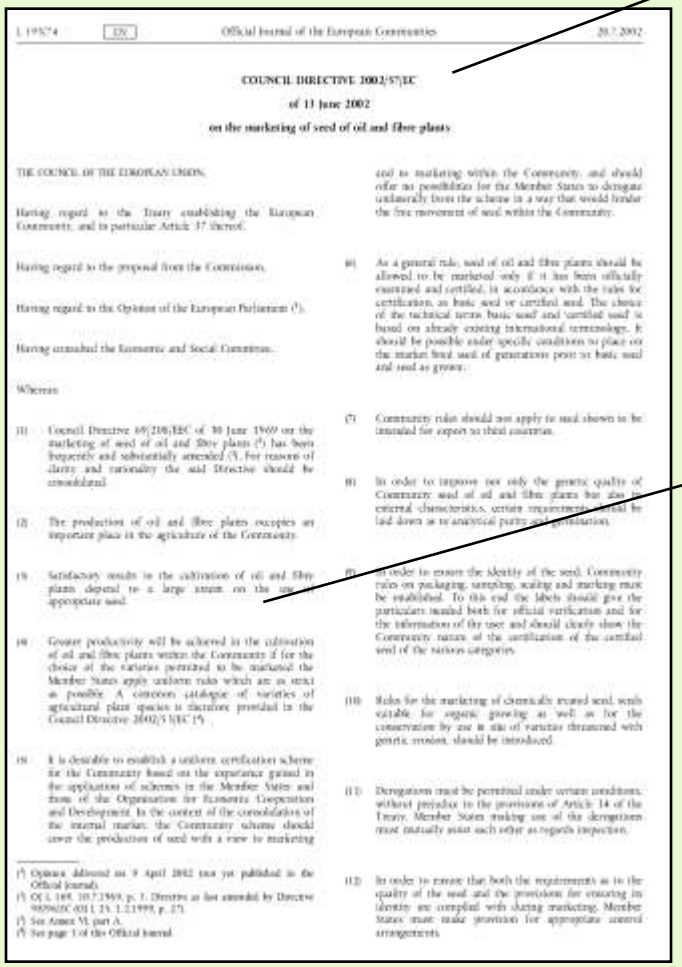
Low moisture content of the seed:

- 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



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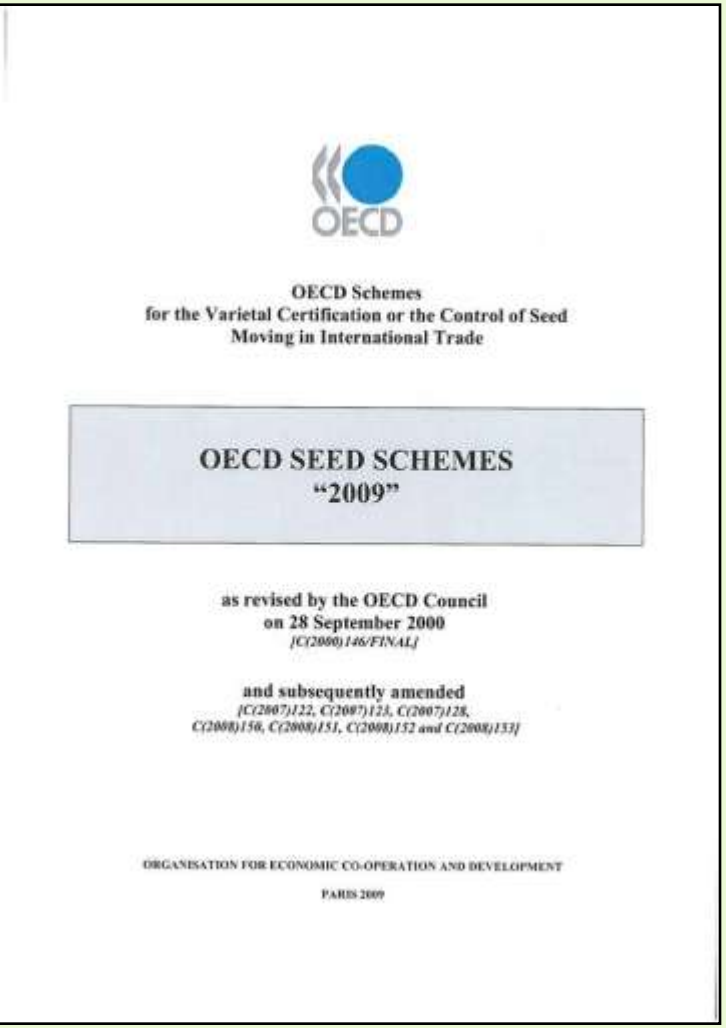
on the marketing of seed of oil and fibre plants

(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



OECD

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

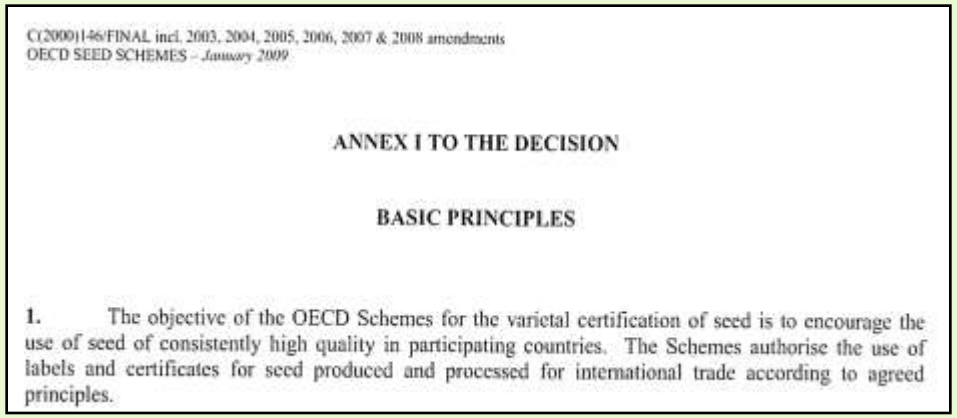
OECD SEED SCHEMES
"2009"

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]

ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

PARIS 2009



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

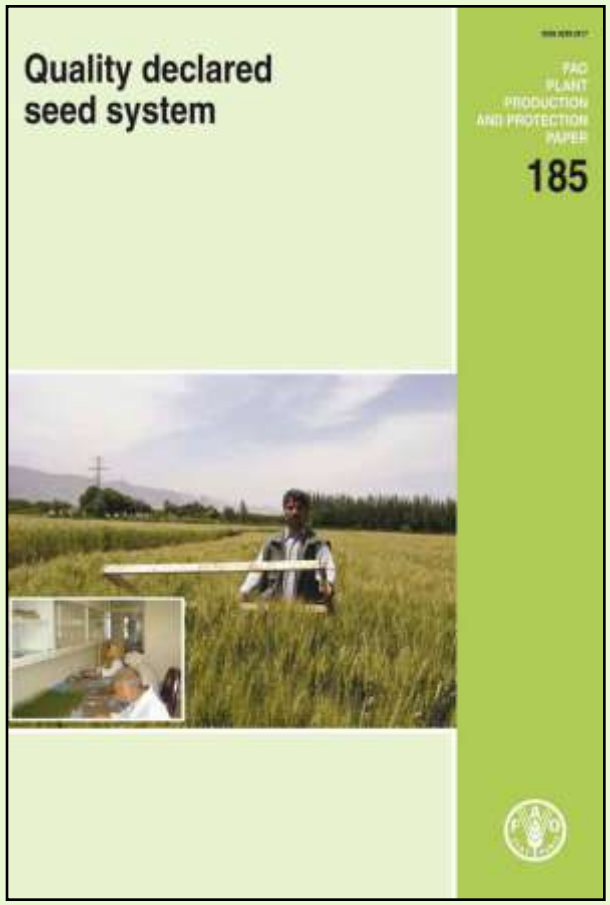
ANNEX I TO THE DECISION

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.

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.



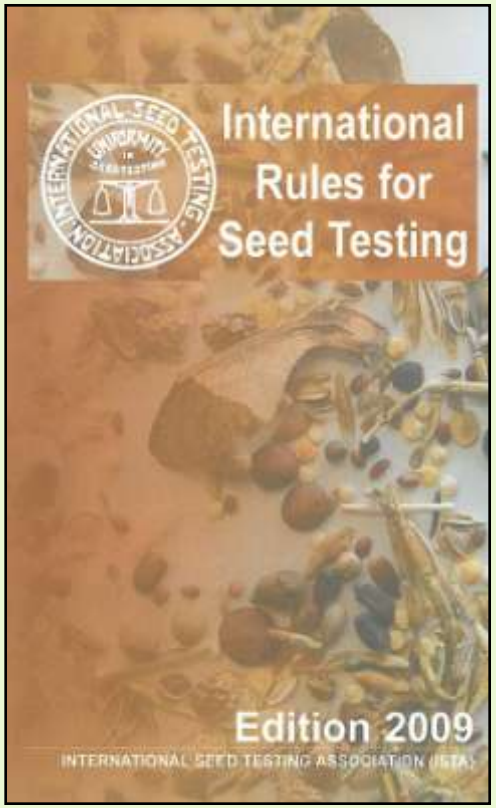
FAO recognizes the pivotal role of seeds in agricultural development. Increasing the quality of seeds can increase the yield potential of the crop and is one of the most economical and efficient inputs to improve crop production and productivity. The FAO/

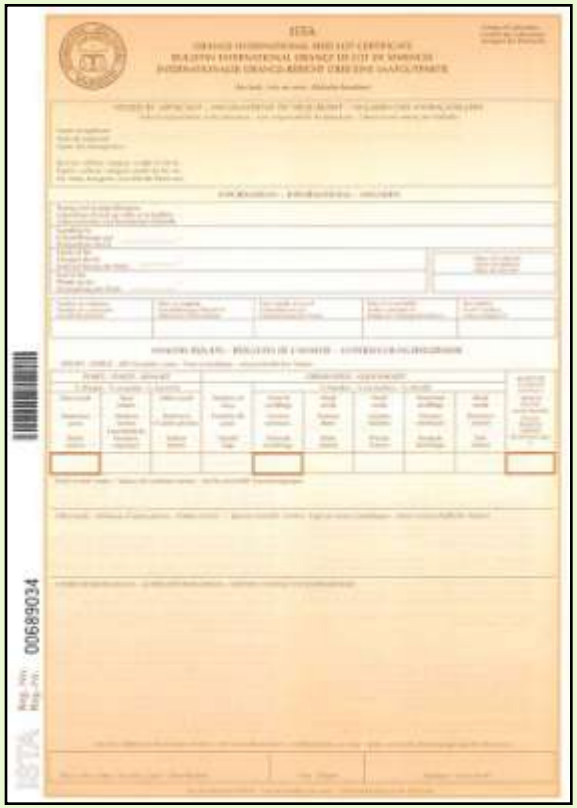
INTERNATIONAL SEED TESTING ASSOCIATION (ISTA)

www.seedtest.org

Vision: Uniformity in Seed Testing world wide

Mission: ISTA achieves its vision by producing internationally agreed rules for seed sampling and testing, accrediting laboratories, promoting research and providing international seed analysis certificates, training and dissemination of knowledge in seed science and technology to facilitate seed trading nationally and internationally.





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Thank you!