

IDENTIFICATION OF QUARANTINE FUNGI IN SEEDS IMPORTED TO ISRAEL



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Introduction

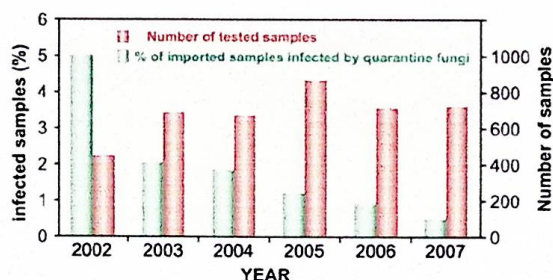
Fungi are economically the most important plant pathogens. The globalization of the seed trade has had a strong impact on the dissemination of seedborne fungi, and care must be taken to avoid import of quarantine fungi. The quarantine service of Israel enables the import of official pre-shipment seed samples, in order to avoid the subsequent rejection of commercial lots that are not in compliance. Most of the seed lots are treated with fungicides before being imported to Israel, and arrive with a phytosanitary certificate declaring that they are free from pathogens. Health tests of imported seeds are performed nevertheless, with the main objective being prevention of the introduction of quarantine fungi into Israeli agriculture.

Materials and Methods

Sampling of seed lots is carried out by trained personnel. Seeds are tested for pathogens by conventional methods as published by ISTA, NAKG and USDA or by methods developed in our laboratory. After testing the pre-shipment samples and ensuring that they are free from all relevant pathogens, importation of most commercial seed shipments can proceed without any further tests.

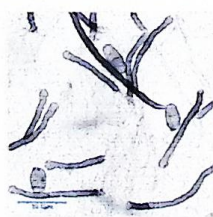
Results and Discussion

During the years 2002-2007 a total of about 4,000 imported seed samples of field crops, vegetables, herbs, flowers and trees were tested at the Official Seed Testing Laboratory of Israel. In spite of what was declared on seed import certificates, seeds infected by quarantine fungi were occasionally found. However, the percentage of infected samples fell by nearly 90% over this time, while the number of tested samples increased by more than 60%.

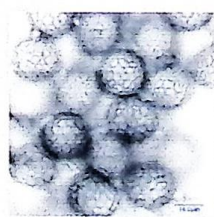


The percentage of samples infected by quarantine fungi decreased annually from 5% in 2002 to 0.6% in 2007.

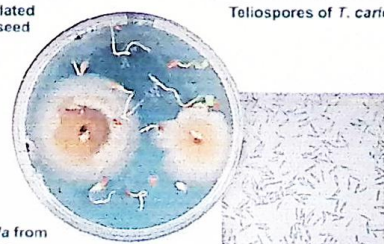
Overall during 2002-2007 ten quarantine pathogens were identified in 1.76% of the lots tested. *Gloeotinia granigena*, *Tilletia* sp., *Drechslera siccans*, *D. triseptata* and *D. dematioides* in ryegrass, *Stenocarpella maydis*, *Cochliobolus carbonum* and *Colletotrichum graminicola* in corn, *Tilletia controversa* and *T. caries* in wheat and *Colletotrichum linicola* in flax.



D. triseptata isolated from ryegrass seed



Teliospores of *T. caries*



Colonies of *C. linicola* from flax seeds on agar

Spores of *C. linicola*

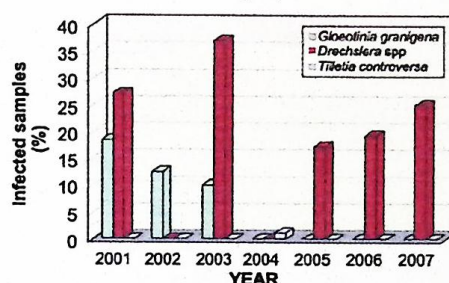
In addition, sclerotia of *Claviceps purpurea* were found as a result of purity tests in ryegrass, wheat, rye and fescue seed samples.

Seed sample numbers and percentage of samples infected by quarantine fungi

Year	2002		2003		2004		2005		2006		2007	
Group	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Corn	123	13.8	107	10.2	96	5.2	128	7.83	100	4	96	2
Ryegrass	113	11.5	148	8.78	133	0.75	153	3.28	145	8.8	159	4.4
Bean	82	1.2	49	0	72	0	62	0	75	0	54	0
Tomato	44	4.54	63	0	82	0	133	0.75	81	6.1	109	6.5
Pepper	26	0	64	0	124	0	167	0	114	0	184	0

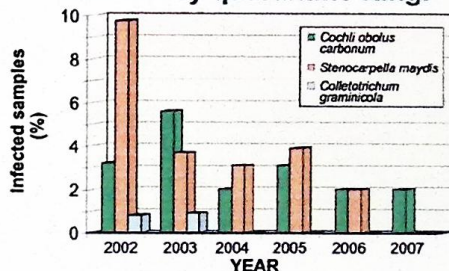
* The seed samples were infected by *Fusarium oxysporum*. Pathogenicity tests were not performed to determine if samples infected by the quarantine race *F. oxysporum* f. sp. *lycopersici* race III.

Percentage of imported ryegrass samples infected by quarantine fungi



Percentage of ryegrass samples infected by *G. granigena* decreased annually until 2004, after which it was not detected at all.

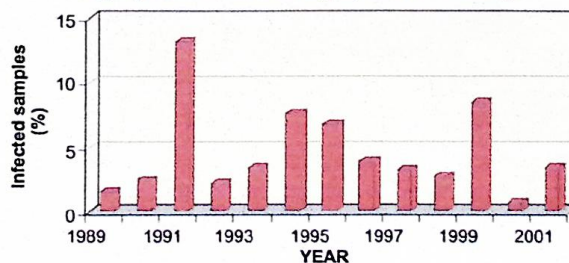
Percentage of imported corn samples infected by quarantine fungi



C. carbonum was detected every year from 2002-2007. The percentage of corn samples infected by *S. maydis* decreased annually, until by 2007 this fungus was not detected at all.

During the years 1989-2001, out of a total of about 3,400 imported seed samples, an average of 4.5% were found each year to be infected by quarantine fungi, although the annual percentage varied considerably over the years.

Percentage of samples infected by quarantine fungi (1989-2001)



Conclusion

The reduction in the percentage of infected samples detected over the past 19 years is very encouraging as an indication of worldwide efforts to export only healthy seeds. A further decrease in the international dissemination of infected seeds, will require even greater cooperation among countries and harmonization of testing methods.