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Fungal and bacterial plant pathogens intercepted in germplasm introduced into India during 2007–10

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National Bureau of Plant Genetic Resources (NBPGR), New Delhi is the nodal agency for introduction of exotic germplasm for research purpose in India. While processing the planting material for quarantine clearance, a number of pathogens having economic significance including the ones not known to occur in India were intercepted from time to time (Agarwal *et al*. 2004, Singh *et al.* 2007, Dev *et al*. 2009). In this paper, quarantine significance of the pathogens intercepted in germplasm introduced during 2007–10 is discussed.

During 2007–10, a total of 960 consignments comprising 305 457 samples in the form of seeds (298 300) and vegetative propagules (7 157), viz. cuttings, rooted plants, tubers and *in vitro* culture plantlets from 51 countries were received for quarantine processing. These samples comprised germplasm (85 391) and international trials (220 066) belonging to 116 crop species and their wild relatives. Number of seeds and vegetative propagules in the samples varied from 10-1 000 seed and 2–20 propagules, respectively.

The complete sample in all the consignments were first examined visually and then under stereo-binocular microscope for the presence of fungal mycelium/ fructifications such as ergot sclerotia, rust pustules, smut and bunt balls and for symptoms such as discolourations, deformation, malformation etc. Seeds suspected to contaminated with rust/smut/mildews were subjected to washing test by adding a small amount of distilled water in a test tube. The tube was shaken on a mechanical shaker for two minutes and the supernatant was examined under the stereo-binocular microscope and compound microscope for detection of oospores/spores.

Unhealthy-looking seeds/ plant bits in the samples were subjected to blotter test. Number of seeds/plate varied from 10 to 25, depending on the size of the seed and size of sample. Plates were incubated for seven days at 20±1^{0}C under alternating cycles of 12 hr light and darkness and examined on eighth day for pathogenic fungi and bacteria. Pathogens were identified on the basis of colony characters under stereo-binocular microscope and fruiting bodies/spore characters under compound microscope.

Seedlings of brassicas showing 'V' shaped lesions were cut with a sharp blade and mounted in a drop of water for presence of *Xanthomonas campestris* pv. *campestris*. Slides were examined under compound microscope for oozing of bacteria from vascular bundles. The bacterium was isolated on nutrient-agar medium and examined after 72 hours of incubation. Studies on morphological, cultural and biochemical characteristics were undertaken. The bacterial colonies were yellow, raised, convex, shiny and mucoid on yeast glucose chalk agar medium. The bacterium was aerobic, Gram-negative, rod-shaped, 0.7-3.0 × 0.4-0.5 μm, motile with a single polar flagellum. It did not reduce nitrates but hydrolyzed starch, casein and gelatin. The bacterium produced acid from arabinose, dextrose, galactose, glycerol, maltose, mannitol, raffinose and saccharose.

Out of 699 samples of tomato germplasm imported from Thailand, fifty samples of different cultivars having enough quantity of seed were subjected to classical ELISA protocol using polyclonal antiserum for detection of *X. vesicatoria*. Seed samples were ground in phosphate buffered saline-Tween 20, *p*H 7.4 + 0.2% bovine serum albumin + 2% polyvinyl pyrrolidone (PVP). The extracts (1:20 w:v) were collected and processed in microtiter plates (Nunc Maxisorp) using Immunoglobulins (IgG) and enzyme conjugate at 1:200 dilution each. The lyophilized samples were used as positive and negative controls. The enzyme substrate used was *p*-nitro phenyl phosphate (1 mg/ml). The optical density (OD)

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values of samples were recorded at 405 nm using ELISA plate reader (TECAN Sunrise, Austria) at a time interval of 15 min., 30 min., 1 hr, 1.30 hr and 2 hr after incubation. A sample was considered as infected if its OD value was twice that of negative control.

A total of 26 993 samples of chemically-treated germplasm and international trials of wheat, barley and triticale were grown in post-entry quarantine nursery (PEQN). Phytosanitary certificates accompanying these consignments stated that seeds were treated with Daconil and Vitavax 300 g/kg. Crops were inspected regularly for detection of seed-borne pathogens.

Infected samples were salvaged by subjecting to suitable treatments, e g hot water treatment (HWT) at 50^0C for 20 min., alcohol + sand wash and fungicidal seed dressing/ dip for vegetative propagules before their release to the indenters.

A total of 3 810 samples were found infected with 54 pathogens (52 fungal and 2 bacterial) of quarantine significance including pathogens not known to occur in India, known to possess a number of physiological races, having wide host range and known to cause significant economic losses in seeds and planting material of different crops from 35 countries (Table 1). Out of these, 2 742 (~72% of the total infected) samples were from USA which constituted ~16% of the total import from USA.

Stereoscopic observations and seed washing test revealed presence of *Peronospora manshurica* (Naumov) Syd. ex Gaum., the causal agent of downy mildew of soybean in 24 samples of *Glycine max* (L.) Merr. from Brazil (13 samples out of 47) and USA (11 samples out of 53) amounting to 8.7% of the total import of soybean (276 samples from four countries). Soybean samples from Australia and Taiwan were found free of *P. manshurica*, though, earlier it was repeatedly intercepted from Taiwan (Agarwal *et al.* 2006). Oospores can remain viable for eight years and the fungus is reported to have a large number of physiological races. In France, *P. manshurica* was reported for the first time in 1974 (CAB International 2007) indicating the possibility of its spread into new areas through infected seed. *P. manshurica* is not known to occur in India and interception of this fungus is of high quarantine significance. All the infected samples were rejected and incinerated.

A. raphani Groves & Skolko was detected in two samples of *Camelina sativa* (L.) Crtz. from Australia. Though *A. raphani* infects members of Crucifereae, the fungus was not reported earlier on *Camelina*.

Dendryphion penicillatum (Corda) Fr. (=*Brachycladium penicillatum* Corda), the causal agent of leaf blight/ capsule rot was intercepted in *Papaver* spp. from Germany and UK. *D. penicillatum* is highly destructive for poppy in Europe and Asian countries where it is an economically important crop. Potential of this fungus as mycoherbicide is being investigated in certain countries (Nichole *et al*. 2000). In India, there was the only incidence of its occurrence in Rajasthan (Sehgal *et al.* 1971) therefore, all the infected samples were rejected.

Diplodia maydis (Berk.) Sacc., the causal agent of ear rot in maize was intercepted from USA and Somalia. In India, the disease is restricted to Sikkim region only (CAB International 2007). *Melanospora zamiae* Corda, the causal agent of crown rust of maize was intercepted on 21 samples from USA. In India it is intercepted for the first time in the imported germplasm. The report of the Technical Working Group 1 of Australia listed this as a pathogen of quarantine significance and highlighted the risk associated in the bulk maize import from USA (Irwin *et al.* 1999).

Drechslera sorokiniana (Sacc.) Subram. & Jain, the causal agent of leaf/seedling blight is the most important foliar pathogen of wheat and barley. The fungus was intercepted on 58 samples of eight crop species from 11 countries. There are many physiological races and geographically remote populations are reported to differ in virulence (CAB International 2007).

Fusarium verticillioides (Sack.) (=*F. moniliforme* Sheldon), the causal agent of stalk rot/ear rot of maize has a wide host range and it was intercepted in 53 crop species from 33 countries including 15 crop species where it is not known to be seed-borne (Table 1).

Xanthomonas campestris pv. *campestris* (Pammel) Dowson, the causal agent of black rot of crucifers was intercepted in 34 samples of *Brassica* spp from five countries. The bacterium is reported to survive in seeds up to three years (CAB International, 2007) and seed infection as low as 0.03% can cause epidemic in a field (Vicente *et al.* 2001). Fargier and Manceau (2007) reported existence of nine races in *X. campestris* pv. *campestris*. In past, *X. campestris* pv. *campestris* was intercepted in brassicas from 38 countries (Singh *et al.* 2006). Infected samples were salvaged by subjecting to HWT.

X. vesicatoria (Doidge) Dowson the causal agent of stem and leaf blight in tomato was intercepted in four samples of *S. lycopersicum* from Thailand. In Europe *X. vesicatoria* is listed as A2 quarantine pest and seven races (0-6) were known to occur in the bacterium (CAB International 2007).

Crops raised from chemically treated samples of international trials/ germplasm of wheat, barley and triticale from Mexico (CIMMYT), Syria (ICARDA), Nepal, USA and Turkey revealed 53 accessions infected with *Ustilago nuda* fsp *tritici* schaffnit (loose smut of wheat), *U. nuda* f.sp. *hordei* Schaffnit (loose smut of barley) and *U. hordei* (Pers.) Lagerh (covered smut of barley) (Table 1). Similar observations were also reported earlier (Dev *et al.,* 2003). *U. nuda* fsp *tritici* is known to possess high degree of variability among the isolates and existence of 13 races and variation in aggressiveness among the races in *U. hordei* is reported (CAB International 2007). Infected plants were uprooted and incinerated. Detection of these diseases in crops raised from chemically treated seeds indicated that blanket seed

Table 1 Interceptions of fungi and bacteria in germplasm introduced during 2007–10

Fungi/bacteria intercepted	Host	Country/source (number of samples infected/processed)
[2,$]*Alternaria brassicae* (Berk.) Sacc.	*Brassica juncea* (L.) Czern. & Coss	Australia (1/54), Belgium (2/1017), Korea (4/146)
	B. napus L.	Australia (5/476)
	B.oleracea L.	China (3/138), Netherlands (11/1217)
[2,$]*A. brassicicola* (Schwein.) Wiltshire	*B. juncea*	Australia (4/54), Belgium (2/1017), Korea (15/146)
	B. napus	Australia (12/476)
	B. nigra L.	Australia (4/57), Canada (1/1)
	B. oleracea	China (4/138), Netherlands (39/1217), Russian Federation (6/10), UK (11/56)
	Brassica spp	USA (1/38)
	Crambe spp	USA (10/167)
[2,$]*A. cucumerina* (Ell. & Ev.) Elliott	*Cucumis melo* L.	USA (1/49)
[2,$]*A. helianthi* (Hansf.) Tubaki & Nishih.	*Helianthus annuus* L.	France (2/564), USA (3/682)
[2,$]*A. padwickii* (Ganguly) Ellis	*Oryza sativa* L.	Japan (4/59), Philippines: IRRI (8/46,300)
[2,$]*A. pluriseptata* Karst. & Har. Ex Peck) Jørst.	*Citrullus vulgaris* Thunb.	Thailand (1/1388)
[2]*A. raphani* Groves & Skolko	**Camelina sativa* L. Crantz.	Australia (2/2)
[2,$]*A.sesami* (Kawam.) Mohanty & Behera	*Sesamum indicum* L.	USA (16/41)
[2,$]*A. solani* Sorauer	*Capsicum annuum* L.	Taiwan (1/537)
[2,$]*A. zinniae* Pape ex Ellis	*H. annuus*	USA (2/682)
[2,¤] *Botrytis cinerea* Pers.: Fr.	*Aegilops speltoides* Tausch.	USA (7/23)
	Allium cepa L. (bulbs)	UK (3/46)
	B. juncea	Belgium (1/1017)
	B. oleracea	Netherlands (1/1217), UK (10/56)
	Carthamus arborescens L.	Germany (1/1)
	C. glaucus Bieb.	Germany (4/5)
	C. lanatus L.	Germany (4/16)
	C. tinctorius L.	Germany (13/32)
	C. vulgaris	Thailand (1/1388)
	Fragaria vesca L. (cuttings)	USA (2/223)
	Lactuca sativa L.	UK (5/55)
	Momordica charantia L.	Taiwan (1/44)
	Praecitrullus fistulosus (Stocks) Pangalo	USA (1/30)
	Prunus spp. (Plants)	USA (1/450)
	Solanum lycopersicum L.	Thailand (1/699)
	Solanum tuberosum L. (TPS)	Holland (1/15)
	Zea mays L.	Mexico: CIMMYT (1/12,357), Thailand (1/4102)
[2]*Cephalosporium maydis* Samra, Sabet & Hingorani	*Z. mays*	Mexico: CIMMYT (1/12,357), Thailand (7/4102), USA (59/5259)
Ceratocystis sp.	*Citrus reshini* Tanaka	Brazil (1/4)
[°,2 $]*Cercospora kikuchii* (Matsu & Tomoyasu) Gardner	*Glycine max* (L.) Merr.	Brazil (1/47), USA (1/53)
[2,¤]*Colletotrichum dematium* (Pers. ex Fr) Grove	*Abelmoschus esculentus* (L.) Moench	Taiwan (3/13)
	Capsicum annuum L.	Taiwan (1/537)
	Cicer arietinum L.	Canada (1/3)
	Eleusine spp	USA (1/31)
	G. max	Australia (1/2), USA (3/53)
	Jatropa curcas L.	Mexico (1/3)
	P. fistulosus	USA (1/30)

Contd.

Fungi/bacteria intercepted	Host	Country/source (number of samples infected/processed)
[2,$]*C. gloeosporioides* Penz. (Sacc.)	*C. annuum*	Taiwan (3/537)
	S.lycopersicum	Taiwan (1/390)
	S. tuberosum (TPS)	USA (1/302)
	Trifolium alexandrinum L.	USA (1/27)
[2,$]*C. graminicola* (Ces.) Wilson	*Z. mays*	Thailand (4/4102), USA (4/5259)
[2]*Curvularia andropogonis* (Zimm.) Boedijn.	*C. annuum*	Korea (2/132)
[2]*C. tuberculata* Sivan.	*S. lycopersicum*	Netherlands (1/44)
[2,#]*Dendryphion penicillatum* (Corda) Fr.	*Papaver bracteatum* Lindley	Germany (4/4)
(=*Pleospora papaveracea* (de Not.) Sacc.)	*Papaver somniferum* L.	Germany (9/30), UK (2/2)
[2]*Diplodia maydis* (Berk.) Sutton	*Z. mays*	Somalia (1/78), USA (5/5259)
[2]*Drechslera avenae* (Eidam) Scharif	*Avena sativa* L.	USA (1/10)
[2]*D. graminea* (Rabenh. ex Schltdl.) Shoemaker	*A. sativa*	USA (1/10)
[2,?,$]*D. maydis* (Nisikado & Miyabe) Subram. & Jain	*Z. mays*	Indonesia (1/760), Mexico: CIMMYT (6/12,357), Philippines (2/397), Somalia (1/78), Thailand (14/4102), USA (5/5259)
[2,$]*D. oryzae* (van Breda de Haan) Subram. & Jain	*Oryza sativa* L.	Japan (9/59), USA (5/677)
[2,$]*D. sorghicola* (Lefebvre & Sherwin) Rich. & Fraser	*C. vulgaris*	China (1/7)
	P. somniferum	UK(2/2)
	Triticum aestivum L.	Mexico: CIMMYT (1/1,44,442)
	Z. mays	Thailand (2/4102), USA (1/5259)
[2,?,¤]*D. sorokiniana* (Sacc.) Subram. & Jain	*A. speltoides*	USA (4/23)
	A. sativa	USA(1/10)
	B. juncea	Australia (4/54), Korea (1/146)
	B. napus	Australia (4/476)
	C. annuum	China (1/12)
	H. vulgare	Syria: ICARDA (1/19126),USA (1/41)
	S. lycopersicum	Taiwan (2/390)
	T. aestivum	Australia (1/1193), Mexico: CIMMYT (24/1,44,4442), Nepal (5/4858), South Africa (2/6), USA (7/2097)
	T. durum	Canada (1/5)
	Triticum spp.	France (1/934)
[2,¤,$]*F. verticillioides* (Sacc.) Nirenberg (= *F. moniliforme* Sheldon)	**A. esculentus*	Taiwan (1/13)
	**A. speltoides*	Israel (1/320), USA (5/23)
	A. cepa	Germany (2/16)
	Atriplex spp.	USA (5/12)
	A. sativa	USA (2/10)
	**Beta vulgaris* L.	USA (2/4)
	B. juncea	Belgium (14/1017)
	B. napus	Australia (1/476)
	B. oleracea	China (1/138), Netherlands (4/1217)
	C. annuum	Czech Republic (1/1), France (1/4), Korea (1/132), Spain (2/2), Taiwan (17/537), USA (1/69)
	C. arietinum	Canada (1/3), USA (5/140)
	C. vulgaris	China (1/2), Thailand (27/1388), USA (5/95)
	C. reshni	Brazil (3/8)
	Crambe spp.	USA (2/167)
	C. melo	Netherlands (9/10), USA (4/49)
	Cucumis sativus L.	Czech Republic (6/10), Korea (4/149)
	Cucurbita maxima Duchesne	Spain (2/2)
	**Cuminum cyminum* L.	UAE (3/5)

Contd.

Fungi/bacteria intercepted	Host	Country/source (number of samples infected/processed)
	*_Eleusine_ spp.	USA (1/31)
	Ficus carica L. (cuttings)	USA (1/31)
	*_Foeniculum vulgare_ Mill.	UAE (1/5)
	*_Geranium robertianum_ L.	UK (2/2)
	G. hirsutum	Israel (10/41), Pakistan (1/4), USA (70/2194)
	G. max	Brazil (3/47), Taiwan (4/174), USA (9/53)
	H. annuus	France (5/564), USA (1/682)
	H. vulgare	Australia (1/26), Canada (1/3), Syria: ICARDA (1/19126)
	*_Hyocyamus niger_ L.	Denmark (2/3)
	*_Impatiens balsamina_ L.	UK (5/13)
	*_Indigofera tinctoria_ L.	USA (1/9)
	*_J. curcas_	Italy (1/23), Mexico (3/3)
	L. sativa	UK (1/55)
	O. sativa	Egypt(1/1), Japan (8/59), Philippines: IRRI (9/46300), USA (6/677)
	*_P. bracteatum_	Germany (1/4)
	*_P. somniferum_	UK (1/2) , Germany (1/30)
	Pennisetum glaucum (L.) R.Br.	USA (3/10)
	*_Perilla frutescens_ (L.) Britton	USA (2/19)
	Pisum sativum L.	USA (3/543)
	S. indicum	USA (1/41)
	S. lycopersicum	France(1/9), Taiwan (16/390), Thailand (4/699)
	Solanum asthiopicum L.	France (1/4)
	S. melongena L.	USA (1/11)
	S. tuberosum (TPS)	USA (4/302)
	S. tuberosum (_in vitro_)	Germany (1/5), Peru (1/169)
	T. alexandrinum	USA (6/27)
	T. pratense L.	Japan (1/4), USA (17/76)
	*_Trigonella foenum-graecum_ L.	Syria (3/64), UAE (1/5)
	T. aestivum	Australia (9/1193), France (4/40), Syria: ICARDA (1/7103), Mexico: CIMMYT (31/1,44,442), USA (10/2097)
	T. turgidum	USA (2/4)
	Z. mays	Argentina (10/71), Brazil (4/362), Chile (68/1736), Indonesia (16/760), Italy (2/13), Mexico: CIMMYT (18/12,357) , Nigeria (2/59), Philippines (50/397), Somalia (8/78), South Africa (3/90), Thailand (123/4102), USA (392/5259)
[2,?]_F. oxysporum_ Schlecht. Ex Fr	_A. cepa_	Germany (1/3)
	C. annuum	Taiwan (1/537)
	S. lycopersicum	Netherlands (1/44), Thailand (2/699)
[2]_F. poae_ (Peck.) Wollenw.	_A. sativa_	Syria: ICARDA (1/100)
	H. vulgare	Australia (11/26)
	T. aestivum	Australia (1/1193), South Africa (1/6)
[2,?,¤,$]_F. solani_ (Martius) Sacc.	_A. cepa_	UK (1/46)
	B. juncea	Belgium (6/1017)
	Brassica spp.	UK (1/56)
	C. annuum	China (3/12), France (1/4), Taiwan (5/537)
	C. reshni	Brazil (1/8)
	G. max	Taiwan (4/174), USA (1/53)
	G. hirsutum	USA (1/2194)
	Malus spp. (plants)	USA (1/800)

Contd.

Fungi/bacteria intercepted	Host	Country/source (number of samples infected/processed)
	P. sativum	USA (1/543)
	Prunus spp. (plants)	USA (3/450)
	S. tuberosum (TPS)	USA (1/302)
	T. aestivum	USA (1/2097)
	Z. mays	Thailand (1/4102)
[2,¤]*Macrophomina phaseolina* (Tassi) Goid	*C. vulgaris*	Thailand (6/1388)
	G. max	USA (1/53)
	S. lycopersicum	France (1/9)
[2]*Melanospora zamiae* Corda	*Z. mays*	USA (21/5259)
[2]*Nigrospora oryzae* Huds.	*O. sativa*	Philippines: IRRI (1/46300)
	T. aestivum	Mexico: CIMMYT (4/1,44,442
[Ø,°,1]*Peronospora manshurica* (Naumov) Syd. Ex Gaum.	*G. max*	Brazil (13/47), USA (31/53)
[3]*Pestalotia* sp.	*C. reshni*	Brazil (2/8)
	Eucalyptus sp. (rooted plants)	S. Africa (1/50)
[3]*Phoma glomerata* (Corda) Wollenw. & Hochapfel	*I. balsamina*	UK (3/13)
[2]*P. herbarum* Westend	*C. annuum*	Taiwan (5/537)
	O. sativa	USA (5/677)
[3]*P. lycopersici* (Plowr.) Jaczewski	*S. lycopersicum*	Italy (1/18), Taiwan (2/390), Thailand (6/699)
[2,$]*Phomopsis sclerotiodes* Van Kesteren	*C. melo*	Italy (1/16)
	Citrullus spp.	USA (1/118)
[2,$]*Phomopsis sojae* Lehman	*G. max*	Taiwan (1/174), USA (11/53)
[°,1,?]*Puccinia carthami* Corda	*Carthamus* spp.	USA (1825/2257)
[1,?]*Puccinia helianthi* Schwein.	*H. annuus*	France (159/564), USA (13/682)
[2,$]*Rhizoctonia solani* Kuhn	*C. annuum*	Taiwan (1/537)
	C. vulgaris	USA (1/95)
	O. sativa	Japan (3/59)
[2,$]*Sclerotinia sclerotiorum* (Lib.) de Bary	*B. juncea*	Belgium (2/1017)
	C. sativus	Vietnam (4/20)
	Citrullus spp.	USA (1/118)
	P. fistulosus	USA (1/30)
	Z. mays	USA (1/5259)
[°,1,$]*Tolyposporium penicillariae* Bref.	*P. glaucum*	USA (2/10)
[°,$]*Ustilaginoidea virens* (Cke.) Tak.	*O. sativa*	Philippines: IRRI (1/46300)
[3,?]*Ustilago nuda* f.sp. *tritici* Schaffnit	*Triticum* spp.	Mexico: CIMMYT, (21/16,944)
[3,?]*U. nuda* f.sp. *hordei* Schaffnit	*H. vulgare*	Mexico: CIMMYT (2/1656), Syria: ICARDA (2/3647)
[3]*U. hordei* (Pers.) Lagerh.		Mexico: CIMMYT (19/1656), Syria: ICARDA (9/3647)
[2,?,¤]*Verticillium albo-atrum* Reinke & Berthold	*B. oleracea*	Netherlands (1/1217)
	O. sativa	USA (1/677)
[2,?,¤]*V. dahliae* Kleb.	*Citrullus* spp.	USA (2/118)
	C. vulgaris	Thailand (3/1388), USA (5/95)
	Malus spp.	USA (1/800)
	Prunus spp.	USA (1/200)
[2,?,$]*Xanthomonas campestris* pv. *campestris* (Pammel) Dowson	*B. juncea*	Australia (10/54), Belgium (4/1017)
	B. napus	Australia (3/476)
	B. oleracea	China (4/138), Netherlands (11/1217), UK (2/56)
[4,?,$]*X. vesicatoria* (Doidge) Dowson	*S. lycopersicum*	Thailand (4/50)

Figure in parentheses are number of infected samples/ total number of samples); Seed health testing method used: ° visual examination, [1] washing test, [2] incubation test, [3] grow-out test, [4]ELISA; Pathogens: Ø not yet reported from India, ? physiological races reported, * Not known to be the host before, # only one report of occurrence in the country, ¤ having broad host range, $ causing significant economic losses treatment with chemicals does not eliminate the risk of introducing exotic diseases in the country.

Interception of large number of pathogens of quarantine significance on a wide range of crops from different countries underlines the importance of constant vigil leading to safe introductions of PGR required for crop improvement programmes of the country. Such interceptions would go a long way with regard to ensuring biosecurity by preventing the introduction of new pathogens/or more virulent races into the country.

SUMMARY

Quarantine processing of 305 457 samples of 116 crop species and their wild relatives introduced from 51 countries during the period 2007-2010 led to the interception of 54 pathogens of quarantine significance. These interceptions included pathogens not known to occur in India, or those that possess physiologic races or have a wide host range or reported to cause considerable economic losses. This emphasizes the need to conduct a critical examination of the introduced planting material for minimizing the risk of introduction of exotic pathogens or more virulent races into the country.

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