

FRUIT BROWN ROT DISEASE OF APPLES IMPORTED TO MONGOLIA

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ABSTRACT

Mongolia has imported 3094.8 tones apple from China, 318 tones apple from Russia and 140.8 tones from USA for in average for 2010-2011 and regarding to imported apples, 25% brown rot disease infection, 9.8% apple scab, 1.8% mixed infection of brown rot and scab, 1,8% bacterial spotted disease infection and 10% non-infectious disease symptoms were described within study period.

The brown rot of apple fruit is occupied 37-41% in the imported apples from China, 12-19% in the imported apples from USA and 11-29% in the imported apples from Russia, hereof the imported apples from China, the main importer country for apples, has the highest indication on the fruit brown rot disease.

*According to pathogen identification of apple brown rot disease, which are described as *Monilinia fructicola* species that was a cause of the fruit brown rot was widely spread on imported apples. *M. fructicola* species's cultural characters are described as follows: tan coloured, dry, course and ringed colony on prune extract agar medium (upper surface of plate), its colony growth 9.9-17mm. Colony shape is margin entire and sporulation was abundant. Its conidial dimensions 6.06-12.29 μm x 4.85-8.2 μm were measured.*

KEYWORDS: imported apples, disease spread, fruit brown rot infection of apple

INTRODUCTION

The citizens and entities, who imports apples in Mongolia, have insufficient learning and understanding on the quality and safety for the apples, a news and information on it is lacking so that they do not what know disease is in the product or it meets to the food standard or not, who use them in their food, all the time. Also there are much spread apple disease due to the apples are not loaded by an appropriate means of transportation and are nor stored in standard storage. An apple is infected by many different kinds of disease while growing, loading, storing and selling periods and could not meet the food standard. Also apple fruit brown rot is considered

as most harmful disease because of it forms a condition to contaminate funguses, which creates a various mycotoxin.

The novelty of this article is the apple diseases, while storing and selling the imported apples, their harm and contagion spreading, and a sort of fungus, which produces extreme harmful apple brown rot or brown rot disease, were determined and studied. Also for the first time, has described the morphological and cultural characteristics of *Monilinia fructicola* species, which produces the fruit brown rot in apple imported into Mongolia.

RESEARCH MATERIALS AND METHOD

We have taken samples from the apples, being sold in Zamiin –Uud port, Bars trading centre and Narantuul International trade centre for analysis. The laboratorial detailed research has done by using the standard method to diagnose a plant disease.

A fungus culture of the brown rot species was produced on diagnostic standard and selective

mediums. For identification of fungus species was used the key scripts for *Monilinia*./Lien.K.P, 2002/ Fungus photos were taken at laboratory “Nano science and nano-technological centre” in Chair of chemistry, National University of Mongolia For data analysis has used EXCEL program and the ANOVA, T-student testing method in GMP5 software.

OBJECTIVES

Apple is dominant fruit among imported fruits into Mongolia. During the growing, transportation, storing and sale period, the apple may attack and infected by many different pathogens. Therefore our research has proposed to observe the current status of disease spread and its kind; species character of main disease infected the apple.

- To identify the postharvest diseases in apples imported into Mongolia.
- To describe morphological and cultural character of apple fruit brown rot disease (*Monilinia spp*)

RESULTS

In total, last 2.5 years (2009, 2010 and first half year of 2011) 7737 tons of apple imported from China, 795 tons of apple imported from Russia and 277 tons of apple imported from USA./4/. We determined that 11- 39%, were infected by apple brown rot, 4-16% by apple scab and 14% by

bacterial rot respectively among the imported apples by our research. The type, species and spread of the disease, which have been revealed in the imported apples from Russia, China and America in following Table.1, were described.

Disease types revealed in the imported apples

Table 1

Year	Importer countries	Scab (%)	Brown rot (%)	Bacterial spot (%)
2009	CHINA	19	37	18
	RUSSIA	9	25	13
	USA	4	12	7
2010	CHINA	17	38	15
	RUSSIA	13	29	6
	USA	8	19	15
First half year	CHINA	21	41	13
	RUSSIA	7	11	5
	USA	9	12	11

As shown above table, more than 90% of imported apples were imported from China through Zamiin-Uud border.

In study period, we have revealed 2 species of fungus disease, 1 species of bacterial disease, and 2 different abiotic stress symptoms. Disease is described below table.

Table 2

Status of imported apples into Mongolia /Ulaanbaatar/							
Samples	Sampled No of apples (piece)	Healthy apples	Fungal disease observed			Apple bacterial spot <i>Pseudomonas papulans</i>	Non infectious disease
			Brown rot <i>Monilia.s p</i>	Scab <i>Ventur ia inaequalis</i>	Mixed infection of Scab and brown rot		
Total	500	217	125	49	9	50	47
(mean ±CA)	50	21.7±1.7 3	12.5±1.20	4.9±0.58	0.9±0.34	5.0±0.76	4.7±0.6 5
Infection ,%		43.4	25	9.8	1.8	10	9.4

As shown in the above table, the infection highest rate 25% for fruit brown rot, 9.4% for scab, 1.8% for mixed infection, 10% for bacterial spot and 1.8% for non infectious disease were observed.

According to our result, among the apples imported for last 2.5 year, the fruit brown rot disease infection rate was the highest. The result has described below table.

Table 3

Severity of fruit brown rot disease in the imported apples

№	Importer country	Variety of apples	Sampled apples	Frequency	apple			Infection,%	Disease development,%
					healthy	infected	Mean of infection scale		
1	Russia	“Slavyanka”	50	10	24	26	1.69	52	20.8
2	USA	“Chili”	50	10	26	24	1.7	48	20.4
3	China	“Ninshia”	50	10	31	19	2.52	38	23.7
4	New Zealand	“Marroko”	50	10	27	23	1.4	46	16.1

For the brown rot of apple fruit, it is occupied 37-41% in the imported apples from China, 12-19% in the imported apples from USA and 11-29% in the imported apples from Russia, hereof the imported We have identified the species of brown rot disease by using the standard diagnostic methods. Pure culture of this disease was produced on prune extract medium and observation and identification

apples from China, the main importer country for apples, has the highest indication on the fruit brown rot disease.

has done by using key scripts for *Monilinia*. The cultural morphological characteristics of this fungus have shown on table below.

Table 4

Characteristics of *Monilinia fructicola* species

<i>Cultural morphological character</i>	<i>M. fructicola</i>
<i>Colony color</i>	<i>tan</i>
<i>Colony growth \10 days after\</i>	<i>9.9-17mm</i>
<i>Sporulation</i>	<i>Abundant</i>
<i>Ringed concentrated colony</i>	<i>Yes</i>
<i>Lobbed colony margin</i>	<i>No</i>
<i>Conidial dimension</i>	<i>3.99 x 7.341 μm</i>

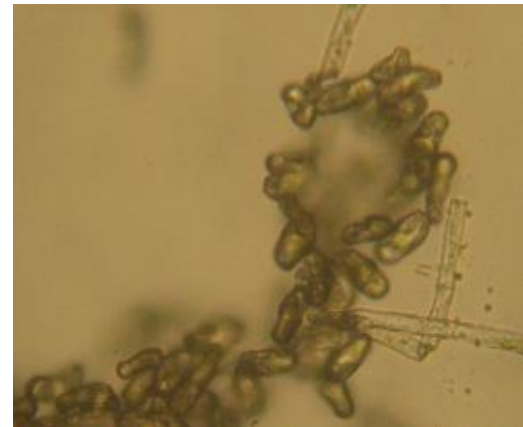
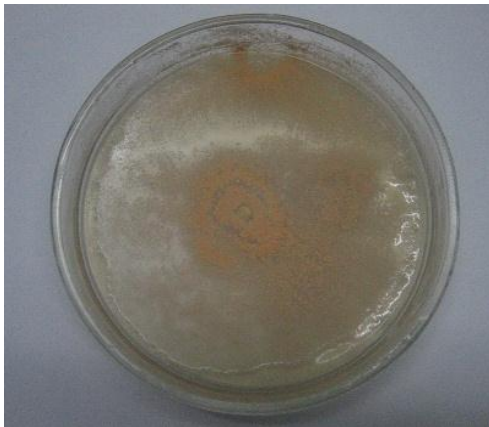


Photo.1 Colony of *Monilinia fructicola* Photo.2 Conids of *M. Fructicola* x450 magnified\

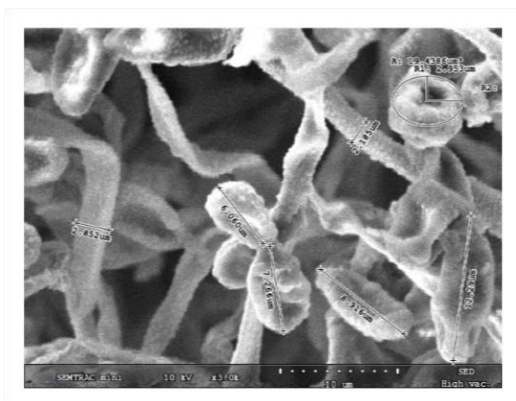


Photo.3. Conidial dimension of *M. Fructicola* \x 3000 magnified, μm\

DISCUSSION

Monilia fructicola species has occurred widely in some northern American and European countries and Asian countries. This species cultural specification that we have revealed, to compare to the results of other researchers, the conidial dimension of *Monilia fructicola* was close (6.06-12.29 μm x 4.85-8.2 μm) to the size of the conids by other researchers/6/.

Disease pathogen of brown rot infects the apple through the growing period and it is in the latent form during the harvesting, packaging, transportation, storing and selling periods but when the suitable condition (temperature, humidity) is being, disease symptoms is appeared and the intensity and development of the disease is increased, and it leads to direct loss.

Another affecting factor for disease occurrence is the conditions for a storage, package or container after importing. In order to decrease such risk, it is

important to transport the apples by appropriate transportation wheels and store them in standard storage rooms to prevent a new contamination.

CONCLUSION

1. Mongolia has imported 3094.8 tones apple from China, 318 tones apple from Russia and 140.8 tones from USA for in average for 2010-2011 and regarding to imported apples, 25% brown rot disease infection, 9.8% apple scab, 1.8% mixed infection of brown rot and scab, 1.8% bacterial spotted disease infection and 10% non-infectious disease symptoms were described within study period.
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