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Full Length Research Paper

Estimation of loss due to post harvest diseases of potato in markets of different districts in Bangladesh

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The storage diseases of potato at Mymensingh, Rajshahi and Dhaka town were surveyed to estimate the loss in potato due to storage diseases. In Mymensingh district, the survey revealed that 3.95, 0.91 and 0.69% of tubers were affected with soft rot, dry rot and scab, respectively. Among the cultivars, maximum loss within the three months namely July, August and September were found in cultivar Cardinal (5.55%), where losses were caused by soft rot (3.97%), dry rot (0.88%) and scab (0.70%). In Rajshahi district, the survey revealed that 3.73, 0.99 and 0.85% of tubers were affected with soft rot, dry rot and scab, respectively. Among the cultivars, maximum loss within the three months were found in Cardinal (5.55%) having soft rot (3.58%), dry rot (1.06%) and scab (0.96%). In Dhaka district, the survey revealed that 3.27, 0.96 and 0.81% of tubers were affected with soft rot and dry rot. Among the cultivars, maximum loss within the three months was found in Diamant (5.55%) due to soft rot (2.49%), dry rot (1.05%) and scab (0.97%). Loss estimated in potato was 5.84, 5.54 and 5.25%, respectively in the months of July, August and September at Mymensingh district. Similarly, in Rajshahi district, it was 5.85, 5.58 and 5.28%, respectively in the month of July, August and September. Again in Dhaka district, it was 5.58, 4.96 and 4.55%, respectively in the months of July, August and September. The study revealed the fact that potatoes were subjected to different diseases in the markets of Bangladesh.

Key words: Potato, storage diseases, months, loss, Bangladesh.

INTRODUCTION

Potato (*Solanum tuberosum L.*) is a tuber crop belonging to the family Solanacae. It contributes alone as much as 54% of the total annual vegetable production of Bangladesh (Anonymous, 2006). In Bangladesh, potato is a crop of great economic significance. Potato production is quite low in comparison to that of the leading potato growing countries of the world such as 70.84 million metric ton in China and 34.66 million metric ton in India (FAOSTAT, 2008).

Potato crop has huge production constraints in the field, in the storage and market, of which soft rot, dry rot, potato scab, potato gangrene and hollow heart are of highest importance.

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The host pathogen interaction is influenced by environment acting on either the potato or the pathogen or on both.

Yield losses attributed to dry rot in storage ranged from 6 to 25%, with up to 60% of tubers affected in some cases. Stevenson et al., (2001); Rahman (1969) and Kamaluddin (1970) reported that 2 to 9% losses of tubers take place every year in each storage due to these diseases. They also reported that of all the diseases in cold storages, dry rot caused by *Fusarium caeruleum* (lib) sacc. is very common and causes most of the damage, but no extensive work has been carried out to assess the loss due to dry rot in Bangladesh.

Bacterial soft rot is considered as one of the most destructive diseases of vegetable in storage and transit conditions (Hossain, 1986). *Erwinia carotovora.* pv. *atroseptica, Erwinia carotovora* pv. *carotovora*. and *Erwinia chrysanthemi* are the three soft rots *Erwinias*

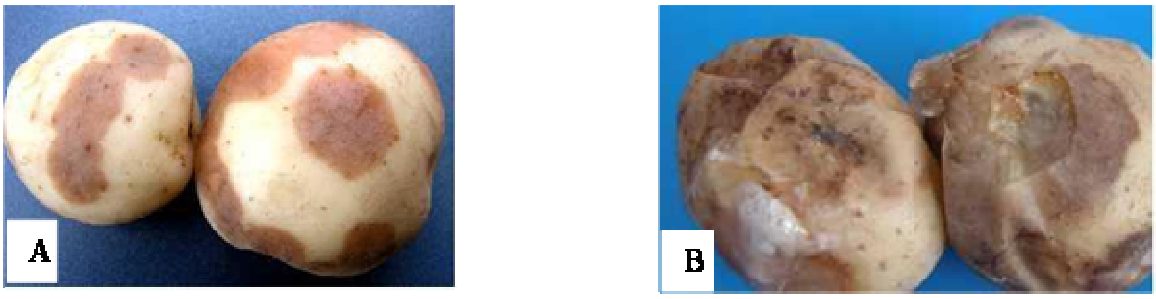

Figure 1. Soft rot of potato caused by *E. carotovora* subsp. *carotovora* (A, initial infection; B, progressive infection).

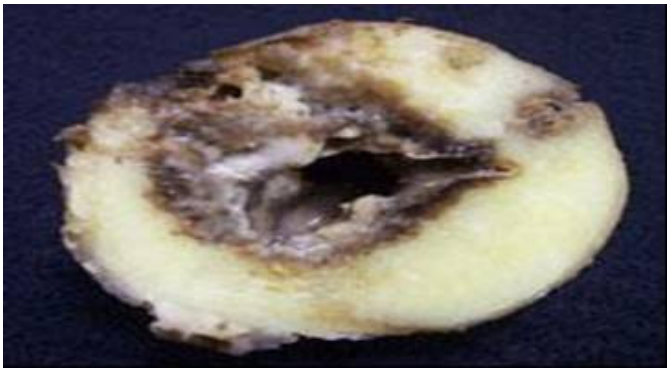

Figure 2. Cross-section of naturally infected potato tuber exhibiting symptoms of soft rot.

(Perombelon and Kelman, 1980).

A recent report indicated that 0.187 million tons of potato were lost in Bangladesh due to diseases (Anonymous, 2006). In Bangladesh, considerable works have been done by Bangladesh Agricultural University BAU and BARI scientist on different aspects of diseases of potato but no systematic work has been done on the market diseases of this crop, except recording the occurrence of a few diseases and only a limited research work has been done. Therefore, this work was carried out with the following objectives: (1) to determine the health status of potatoes in the market storages of Mymensingh, Rajshahi and Dhaka city and (2) to estimate the percentage loss of potatoes due to important diseases occurring in the market storages of Mymensingh, Rajshahi and Dhaka city at three months.

MATERIALS AND METHODS

The experiment was carried out at the Plant Pathology Department and Seed Pathology Center, Bangladesh Agricultural University, Mymensingh.

Survey of diseased potato and Collection of disease sample

Market diseases of potato was surveyed in ten stores shops cum storage under three markets namely Mesua bazar, K. R Market and Shes Moor bazar of Mymensigh, under three markets namely Shahab bazar Master para, Shalbagan Kacha bazar and New market Kacha bazar of Rajshahi and under three markets namely New market Kacha bazar, Kawran bazar and Uttara Kacha bazar of Dhaka during July to September, 2007. In all the shops, tubers were stored in gunny bags, each bag containing 85 kg of potato. Bags were placed either in racks or in piles. In each shop/storage, random sampling was made in four bags per cultivar. For collecting data, the tubers were spread over the floor and the diseased tubers (soft rot, dry rot and common scab) of each bag were sorted out and weight was taken. Data were collected separately on each cultivar once in a week.

Disease incidence of potato and loss estimation

The total number of tuber and the number of infected tuber were counted to calculate the disease incidence.

$$\% \text{ Tuber infection/Disease incidence} = \frac{\text{Number of infected tuber}}{\text{Total number of tuber}} \times 100$$

The diseased tubers from these bags were weighed and these amounts was divided by the total amount observed potatoes in the four bags and multiplied by 100 so as to find out the parentage of loss due to diseases (Islam, 1995). The figure obtained was the amount of diseased tubers per bag. Total loss in each shop of different districts was also calculated.

Table 1. Prevalence of potato diseases in Mymensingh town at three different periods of storage.

Month	Variety	% loss	% soft rot	% dry rot	% scab
July 2007	Diamant	5.83[a]	4.14[ab]	0.97	0.72
	Cardinal	5.84[a]	4.18[a]	0.95	0.71
August 2007	Diamant	5.54[b]	3.94[bc]	0.95	0.64
	Cardinal	5.56[b]	4.00[ab]	0.84	0.72
September 2007	Diamant	5.24[c]	3.72[d]	0.87	0.65
	Cardinal	5.26[c]	3.74[cd]	0.85	0.67
LSD (0.05%)		0.05	0.22	Ns	Ns

Isolation and identification of causal organisms associated with potato

Isolation of bacteria

The diseased tubers were washed and dried in Laminar flow (Figure 1). They were then cut open into two halves (Figure 2). A bit of rotted tissue from the advance margin of the lesions was removed and put in a drop of sterilized water over a clean slide. Another bit of rotted tissue was placed to a healthy potato slices to observe the rotting ability of the isolates. The bacteria were sprayed in the drop of sterilized water over the slide and were isolated by streaking onto nutrient agar plate and incubated at a room temperature of 26℃ for 48 h (Singh and Singh, 2000).

Isolation of fungi

Isolation was made on acidified PDA (potato dextrose agar) medium. The area around the lesion was surface sterilized with an alcohol swab. A piece of surface tissue was removed to expose the edge of the necrotic area and a small bit of the diseased tissue were cut with the help of a sharp scalpel and placed on a Figure of PDA using five pieces from different parts of a lesion. The Figures were incubated at room temperature (28 ± 2℃) for seven to ten days.

Isolation of actinomycetes

A bit of scabies tissue from the advance margin of the lesions was surface sterilized with an alcohol swab, a small bit of the diseased tissues were placed onto nutrient agar Figure incubated at room temperature of 26 to 28℃ for 48 h.

Purification and identification of pathogen

The fungi which grew in PDA Figures out of the most inocula, a very small fragment of mycelia, were transferred to fresh culture Figures from where sub cultures were made transferring fungal block or conidia. The fungi were identified by observing colony characters, linear growth, color in the medium and sporulation (Singh, 1982). Confirmation of the identification was made through microscopic examination of the slides prepared from the fungal culture. Physiological tests identified the isolates and by inoculation some tuber slices in the laboratory. Colony appearance of the bacterial isolates was observed on nutrient agar media. Standard slice inoculation and pinprick method were employed as described by Kumar et al. (1992). Physiological tests were performed according to methods described by Bulbul (1990).

Variety used

Two common varieties (Diamant and Cardinal) of potatoes were used in the experiment and five tubers per variety were used for inoculation per isolation. More or less uniform sized of tubers (35 mm) were used.

Test of pathogenicity

Standard slice inoculation method (Kumar et al., 1992) was used to inoculate tubers artificially for bacterial isolates. Before inoculation, the tubers were washed with sterilized water and air dried. For fungal isolates, one method of tuber inoculation, namely block inoculation method was used and pinprick method was used for the pathogenicity test of actinomycetes.

Data record

Data on disease incidence and disease severity were recorded from time to time (at one week interval) during the tenure of the works for requisite parameter.

Experimental design and statistical analysis

The experiment was conducted in randomized complete block design (RCBD) with three replication. Data were statistically analyzed to obtain the level of significance using the MSTAT-computer package program (Russell, 1986). Duncan's multiple range test (DMRT) was used to compare the treatment means.

RESULTS

Survey of diseased of potato in markets of Mymensingh

The survey results of shop cum storage on different market diseases (soft rot, dry rot and scab) of potato in the three markets of Mymensingh are presented in Tables 1 to 3. The average disease incidence of ten

Table 2. Loss estimation of storage potato as affected by various diseases at three different storage period.

Month	% loss	% soft rot	% dry rot	% scab
July	5.84[a]	4.16[a]	0.96	0.71
August	5.54[b]	3.97[b]	0.90	0.68
September	5.25[c]	3.73[c]	0.86	0.66
LSD (0.05%)	0.04	0.15	NS	NS

Table 3. Prevalence of diseased tuber of two varieties potato in the market storage of Mymensingh town.

Variety	% loss	% soft rot	% dry rot	% scab
Diamant	5.54	3.93	0.93	0.68
Cardinal	5.55	3.97	0.88	0.70

shop/storage in Diamant was found as 5.83% (4.14% soft rot, 0.97% dry rot and 0.72% scab) in July, 5.54 (3.94% soft rot, 0.95% dry rot and 0.64% scab) in August and 5.24% (3.72% soft rot, 0.87% dry rot and 0.65% scab) in September in 2007. The average loss in Diamant cultivar due to market disease in the three months was found to be 5.54% (3.93% soft rot, 0.93% dry rot and 0.68% scab) as shown in Table 3. Similarly, the average market disease loss incidence of ten shops cum storage in Cardinal was found as 5.84% (4.18% soft rot, 0.95% dry rot and 0.71% scab) in July, 5.56% (4.00% soft rot, 0.84% dry rot and 0.72% scab) in August and 5.26% (3.74% soft rot, 0.85% dry rot and 0.67% scab) in September, respectively (Table 1). The average losses in Cardinal cultivar due to market disease in the three months were found to be 5.55% (3.97% soft rot, 0.88% dry rot and 0.70% scab). Among the cultivars, maximum loss during these three months was found in Diamant (5.54%) followed by Cardinal (5.55%) as shown in Table 3.

The highest loss of storage potato was found as 5.84% in July while the lowest (5.25%) was found in September due to various diseases shown as in Table 2. The average soft rot incidences were found as 4.16% in July, 3.97% in August and 3.73% in September. The average losses due to dry rot and scab incidences were found lower when compared with soft rot incidence. It was observed that market disease incidences were increased in July, decreased in August and September.

Survey of diseased of potato in markets of Rajshahi

The results presented in Table 4 are of ten selected shops cum storage of Rajshahi town. The average market disease incidence of ten shop/storage in Diamant was found as 5.83% (4.10% soft rot, 0.92% dry rot and 0.81% scab) in July, 5.54 (3.88% soft rot, 0.92% dry rot and 0.74%) scab in August and 5.24% (3.66% soft rot, 0.93% dry rot and 0.65%) in September. The average loss in Diamant cultivar due to market disease in the three months was found to be 5.53% (3.88% soft rot, dry rot 0.92% and scab 0.73%) (Table 6). Similarly, the average market disease loss incidence of ten shops cum storage in Cardinal was found as 5.88% (3.85% soft rot, 0.97% dry rot and 1.06% scab) in July, 5.62% (3.47% soft rot, 1.19% dry rot and 0.96% scab) in August and 5.32% (3.44% soft rot, 1.01% dry rot and 0.87% scab) in September, respectively (Table 4). The average loss in Cardinal cultivar due to market disease in the three months was found to be 5.60% (3.58% soft rot, dry rot 1.06% and 0.96% scab) (Table 6).

The soft rot disease incidence was showed as maximum (3.98%) in July compared with other storage period (Table 5). The average dry rot incidences were found as minimum (0.94%) in July and as maximum (1.05%) in August. The average losses of scab were found as 0.93% in July, 0.85% in August and 0.76% in September. July was the most affected among the storage periods and then the market disease incidence were decreased in August to September.

Survey of diseased potato in markets of Dhaka

The average market disease incidence of ten shop/storage in Diamant was found as 5.86% (4.29% soft rot, 0.86% dry rot and 0.71% scab) in July, 5.58% (4.01% soft rot dry 0.95% rot and 0.62% scab) in August and 5.22% (soft rot 3.83%, dry rot 0.77% and 0.62%) in September (Table 6). The average loss in Diamant cultivar due to market disease in the three months was found to be 5.55% (4.04% soft rot, 0.86% dry rot and 0.65% scab) (Table 9). Similarly, the average market disease loss incidence of ten shops cum storage in Cardinal was found as 5.30% (2.83% soft rot, 1.41% dry rot and 1.06% scab) in July, 4.34% (2.55% soft rot, 0.83% dry rot and scab 0.96%) in August and 3.89%

Table 4. Prevalence of potato diseases in Rajshahi town at three different periods of storage.

Month	Variety	% loss	% soft rot	% dry rot	% scab
July 2007	Diamant	5.83[a]	4.10[a]	0.92[e]	0.81[d]
	Cardinal	5.88[a]	3.85[b]	0.97[c]	1.06[a]
August 2007	Diamant	5.54[b]	3.88[b]	0.92[e]	0.74[e]
	Cardinal	5.62[b]	3.47[d]	1.19[a]	0.96[b]
September 2007	Diamant	5.24[c]	3.66[c]	0.93[d]	0.65[f]
	Cardinal	5.32[c]	3.44[d]	1.01[b]	0.87[c]
LSD (0.05%)		0.08	0.08	0.00	0.00

Table 5. Loss estimation of diseased potato at different storage period of Rajshahi.

Month	% loss	% soft rot	% dry rot	% scab
July	5.85[a]	3.98[a]	0.94[c]	0.93[a]
August	5.58[b]	3.68[b]	1.05[a]	0.85[b]
September	5.28[c]	3.55[c]	0.97[b]	0.76[c]
LSD (0.05%)	0.05	0.05	0.00	0.00

Table 6. Prevalence of diseased tuber of two varieties potato in the market storage of Rajshahi town.

Variety	% loss	% soft rot	% dry rot	% scab
Diamant	5.53	3.88	0.92	0.73
Cardinal	5.60	3.58	1.06	0.96

Table 7. Prevalence of potato diseases in ten shops of Dhaka town at three different periods of storage.

Month	Variety	% loss	% soft rot	% dry rot	% scab
July 2007	Diamant	5.86[a]	4.29[a]	0.86[cd]	0.71[d]
	Cardinal	5.30[c]	2.83[d]	1.41[a]	1.06[a]
August 2007	Diamant	5.58[b]	4.01[b]	0.95[b]	0.62[e]
	Cardinal	4.34[d]	2.55[e]	0.83[d]	0.96[b]
September 2007	Diamant	5.22[c]	3.83[c]	0.77[e]	0.62[e]
	Cardinal	3.89[e]	2.10[f]	0.91[bc]	0.88[c]
LSD (0.05%)		0.20	0.05	0.05	0.05

(2.10% soft rot, 0.91% dry rot and 0.88% scab) in September, respectively (Table 7). The average loss in Cardinal cultivar due to market disease in these three months was found to be 4.51% (2.49% soft rot, 1.05% dry rot and 0.97% scab. The most disease susceptible cultivar was Diamant where average loss was 5.55% (Table 9).

The results of three selected markets in ten shops cum storage of Dhaka are presented in Table 8. The average losses due to soft rot incidences were found as 3.56% in

Table 8. Loss estimation of diseased potato at different storage period of Dhaka

Month	% loss	% soft rot	% dry rot	% scab
July	5.58[a]	3.56[a]	1.13[a]	0.89[a]
August	4.96[b]	3.28[b]	0.89[b]	0.79[b]
September	4.55[c]	2.96[c]	0.84[c]	0.75[b]
LSD (0.05%)	0.14	0.04	0.04	0.04

Table 9. Prevalence of diseased tuber of two varieties potato in the market storage of Dhaka town.

Variety	% loss	% soft rot	% dry rot	% scab
Diamant	5.55	4.04	0.86	0.65
Cardinal	4.51	2.49	1.05	0.97

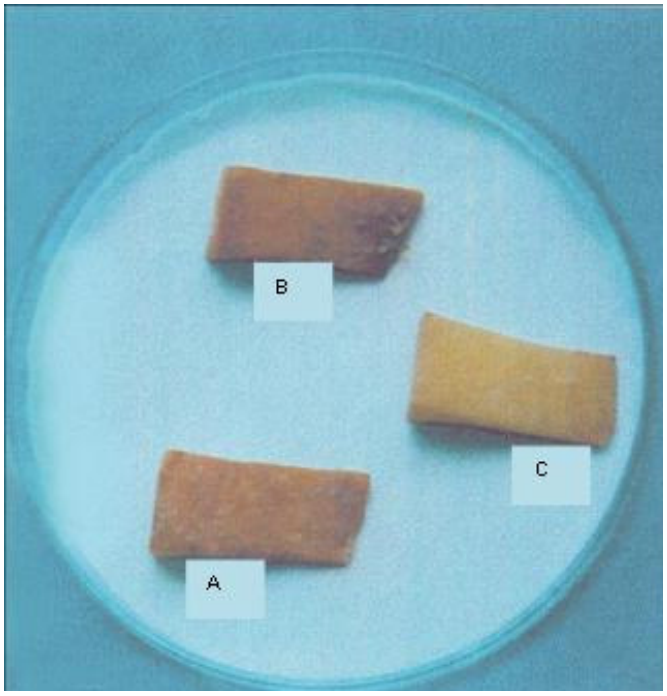

Figure 3. A and B, soft rot diseased; C, healthy slices of potato.

July, 3.28% in August and 2.96% in September. The average dry rot incidences were found as 1.13% in July, 0.89% in August and 0.84% in September. The average loss of scab were found as 0.89% in July, August in 0.79% and 0.75% in September and percentage of loss incidences was 5.58% (July), 4.96% (August) and 4.55% (September). It was observed that market disease incidence were increased in July and decreased in August to September.

Pathogenecity test

Pathogenecity of soft rot pathogen and identification

About a hundred soft rotting bacterial isolates were purified into nutrient agar (NA) medium. Some of them were showed as white to creamy colony appearance and a few were yellowish (Figures 4 and 5). In standard potato slice test, the isolate produced soft rot and the rest

Figure 4. Pure culture of *E. carotovora* (24 h old).

Figure 5. Pure culture of *Pseudomonas* sp. (saprophyte) 24 h old.

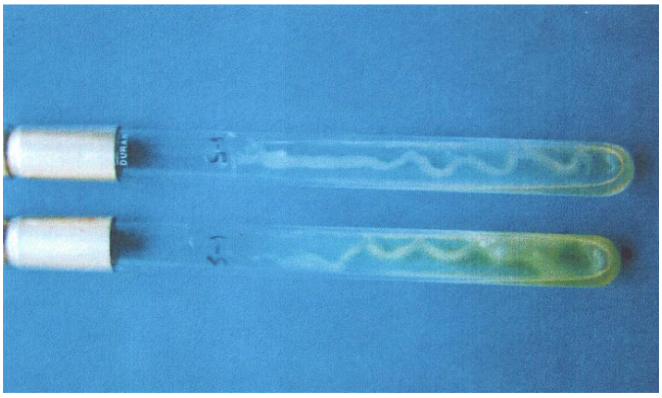

Figure 6. Photograph of isolates of *E. carotovora* (Top) and *Pseudomonas* sp. in slant (down).

of the isolates produced extensive soft rot. It was observed that the isolate was able to grow within temperature 28 to 35°C and some of the isolates were able to grow within temperature 18 to 25°C. The characteristics confirmed the isolates as *E. carotovora* subsp. *Carotovora* and *Pseudomonas* spp. (Figure 6). Besides these, the symptoms observed on potato slices were identical to the soft rot caused by *E. carotovora* subsp. *carotovora* (Figure 3).

Pathogenicity of dry rot of two potato cultivars under block inoculation method in laboratory at storage condition

The mycelium of *F. caeruleum*, the isolated causal organism of dry rot on PDA, was found grayish white, filled with a deep violet blue pigment developed on agar surface after 7 to 10 days (Figures 7 and 8). Later, a cream colored mass of macro conidia was formed from sporodochia which tends to cover the central part of Petri dish growth. Individual hyphae were sparsely septate. Macro conidia were found oval in shape, which formed, sparely in the young cultures (Figure 10).

The incidence of dry rot in the case of var. Cardinal with block method of inoculation the highest disease infection was recorded (Figures 9 and 11). In order to prevalence of lesion size and disease incidence by block method inoculation of *F. caeruleum* in var. Diamant and Cardinal were produce lesion size and diseases infection. It was confirmed that *F. caeruleum*, the inoculated symptoms and natural symptoms rotted tubers were same (Figures 12 and 13).

Pathogenicity test of scab pathogen by pinprick method

The scab disease and severity of infection were found as superficial spot (Mishra and Srivastava, 1991) which was similar to the natural symptoms (Figure 14). The colony of the *Streptomyces scabies* appeared whitish (Figure 15). Tubers of the variety Cardinal were inoculated artificially by selected isolates in pin prick method (Figure 16).

DISCUSSION

The amount of loss, incidence and severity of market disease of two main cultivars of potato were recorded during July to September 2007 at three markets of Mymensingh, Rajshahi and Dhaka. Shop cum storage data indicates that mean loss due to soft rot between the varieties was more or less similar. The loss ranged from 4.45 to 5.58%, 5.28 to 5.85% and 4.45 to 5.58% with minimum and maximum in July and September of Mymensingh, Rajshahi and Dhaka, respectively. Soft rot

Figure 7. External symptom of dry rot of potato caused by *F. caeruleum*.

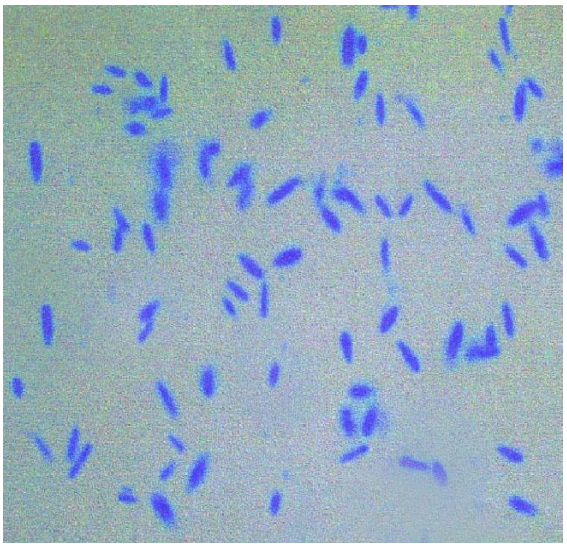

Figure 10. Macro conidia formed from sporodochia of *F. caeruleam*.

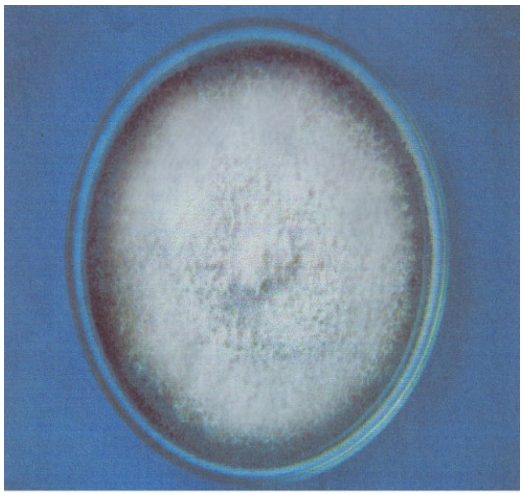

Figure 8. Ten days old pure culture of *F. caeruleum* at room temperature (PDA medium).

Figure 11. Cross-section of potato tuber exhibiting dry rot symptom in two parts in variety Diamant through artificial inoculation after 21 days.

Figure 9. Dry rot symptoms in potato variety Diamant through artificial inoculation (block method).

Figure 12. Dry rot symptom in potato variety Cardinal through artificial inoculation (block method) after 21 days.

Figure 13. Cross-section of potato tuber exhibiting dry rot symptom in potato variety Cardinal through artificial inoculation after 21 days.

A

B

Figure 14. External symptom of scab of potato Cv. Diamant (A) and Cv Cardinal (B) caused by *S. scabies.*

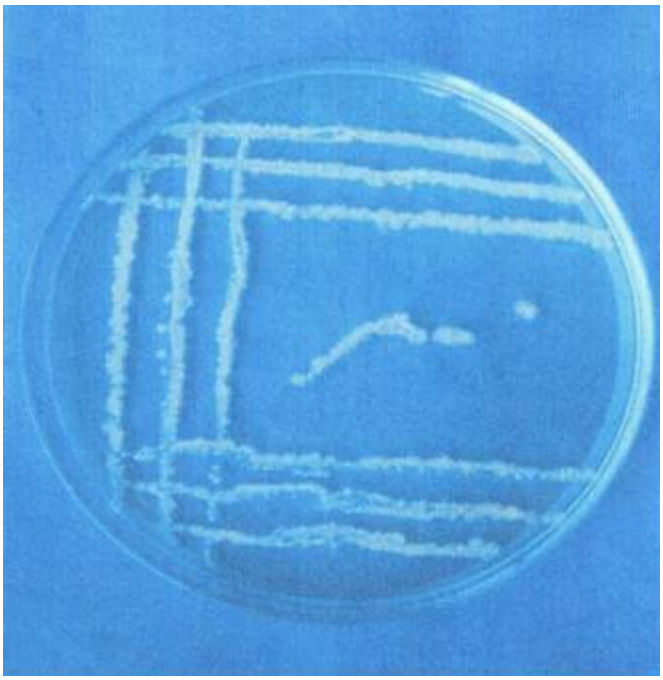

Figure 15. Pure culture of *S. scabies.*

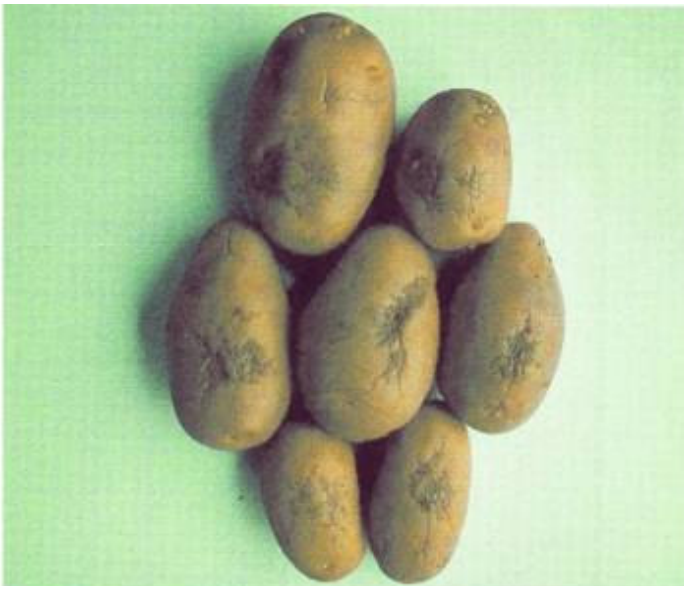

Figure 16. Development of scab of potato (cv. Cardinal) by pin prick inoculation method.

caused by *E. carotovora* (Jones) is the most important post-harvest disease of potato worldwide (Perombelon and Kelman, 1980). Under bad handling and storage conditions, post-harvest losses may reach to 100% (CIP, 1987). Khan et al. (1973) reported that 9.5 to 22% tuber losses occur in cold storage in Bangladesh in which 3 to 11% tuber loss were from only soft rot. Researchers have reported tuber loss due to dry rot from different potato

growing countries (Costa and Krug 1937; Sarvazzi 1954 and Chelkowski 1989). In Brazil, dry rot is very frequent in storage and cause serious loss (Costa and Krug, 1937). Dry rot causes serious losses of storage potato throughout Italy (Sarvazzi, 1954). Chowdhury (1956) reported that potato tuber moth and dry rot cause serious damage up to 50% in the year 1958 which suggest that dry rot can be minimized greatly by maintaining storage temperature of 17 to 25°C over 70% relative humidity and aeration.

Weber et al. (1989) worked with methods developed on potato tubers for susceptibility to soft rot (*E. carotovora*) and wet rot (*Fusarium* spp.). The effects of mechanical damage during harvesting and storage conditions are taken into account. The mean total loss of varieties Diamant were 5.54, 5.53 and 5.55%, whereas 5.55, 5.60 and 4.51% were in Cardinal in Mymensingh, Rajshahi and Dhaka, respectively. Both varieties were more or less effective for the development of dry rot (*F. caeruleum*). Remarkable difference was observed between the two varieties including disease infection and diameter of the lesion size that through block inoculation method Diamant gave comparatively more infection to Cardinal.

Among the two varieties, Diamant was more disease prone to dry rot under artificial inoculation of *F. caeruleum*. A number of methods of inoculation including block and silt methods have been tested by a good number of workers to locate resistant sources of potato against dry rot (Wastie et al., 1989; Langerfeld, 1986; Tamburic-lincic, 1996). Haynes et al. (1997) reported that potato can be determined by inoculation of tuber slices *E. carotovora* subsp. *carotovora* and incubated at 20 and 30°C for 48 h and similar results were found in laboratory condition. Nourian et al. (2002) reported that bacterial soft rot caused by *E. carotovora* (Ecc) is a major disease in stored potatoes. Potatoes were inoculated with bacteria, incubated at 20°C for length of time to produce different levels of disease, and similar results were also found.

Genet (1999) described the characteristics of common scab potato disease caused by *S. scabies,* Lehtonen et. al. (2004). In Egypt, *S. scabies* isolates S_1, S_2 and S_3 were successfully isolated and identified on potatoes. Same results were found by Mishra and Srivastava (1999), and they observed four types of potato scab (*S. scabies*) recognized as: deep, superficial, raised and russet types.

Conclusion

A survey was carried out on the three market diseases of potato in two cultivars namely Diamant and Cardinal. Potato tubers were inoculated with the fungus following block inoculation. The pathogenic ability of the selected isolates was carried out by standard slice inoculation method. Actinomycetes were isolated and pathogenic ability of the selected isolates was carried out by pin prick method. Results of survey in shop cum storage for market disease revealed that the average amount of loss incidence in potato variety Diamant and Cardinal were for the different market area of Mymensingh, Rajshahi, and Dhaka. There was remarkably difference between the two varieties for the method of inoculation for disease area infection and lesion development.

The bacterial isolates were identified as *E. carotovora* subsp. *carotovora* and *Pseudomonas* spp. The potato tuber of Cardinal inoculated with the selected bacterial isolates by standard slice inoculation showed the disease symptoms. Some isolates were highly pathogenic and produced extensive soft rot; a few isolates were pathogenic and produced soft rot of potato slices. Actinomycetes were identified as *S. scabies* by pin prick method that produced superficial spot (scabies).

This study was done for the investigation of soft rot, dry rot and scab of potato in markets to gather a clear idea regarding the causes and factors involved in disease or rots/spoilage of potato in the markets. The study revealed the fact that potatoes were subjected to various diseases in the markets of Bangladesh.

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