

**ECOFRIENDLY MANAGEMENT OF MYCOFLORA ASSOCIATED WITH FRESH FRUITS OF *TRICHOSANTHES ANGUINA* L. AND *T. DIOICA* ROXB. IN STORAGE**

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**ABSTRACT**

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After harvesting the vegetables are contaminated with fungi within 3-4 days of storage that deteriorates food quality and market value as well. Apparently fresh fruits of *Trichosanthes anguina* L. and *T. dioica* Roxb. were collected from five local markets of Dhaka city near the campus of Dhaka University. Three plants extract namely *Allium cepa*, *A. sativum* and *Zingiber officinale* at 20 % concentration were used on the surface of the fresh vegetables to control the fungi associated with them. Plant extract of *Allium sativum* at 20% completely inhibited the vegetative growth of the fungi on fruits of *T. anguina*. and *T. dioica* up to

14 days of storage. Two chemicals viz. sodium bicarbonate and sodium chloride were used on the surface of the fresh vegetables. Sodium bicarbonate at 20% concentration also completely inhibited the vegetative growth of the fungi on fruit surface up to 14th day of storage while Sodium chloride inhibited vegetative growth of fungi on fruits up to seven days. Among the edible oils namely mustard oil, palm oil and soybean oil, mustard oil checked the vegetative growth of fungi up to two weeks, while palm oil and soybean oil checked fungal growth up to 7 days of storage.

Keywords: Ecofriendly, Mycoflora, fresh vegetables, *Trichosanthes anguina*, *T. dioica*

A huge number of vegetables grow in the country both in winter and summer, among them snake gourd (*Trichosanthes anguina* L.) and pointed gourd (*Trichosanthes dioica* Roxb.) are very much popular vegetables to almost all kinds of consumers in Bangladesh. These vegetables usually cultivated and consumed in every part of Bangladesh. *Trichosanthes anguina* is found in the wild across much of South and Southeast Asia, including India, Bangladesh, Nepal, Pakistan, Sri Lanka, Indonesia, Malaysia, Myanmar (Burma), and southern China (Guangxi and Yunnan). It is also regarded as native in northern Australia and naturalized in Florida, parts of Africa and on various islands in the Indian and Pacific Oceans. With some cultivars, the immature fruit has an unpleasant odor and a slightly bitter taste, both of which, to some extent may disappear in cooking.

The fruits of snake gourd become too bitter to eat as it reaches maturity but they are much tastier and more nutritious over other tropical Cucurbits. The fruit can be used in curries or eaten as a vegetable like green beans. The bright red pulp around the mature seeds is extracted and used in cooking in much the same way that tomatoes are used. Leaves and young shoots also may be cooked as a vegetable. The fruit is

considered to be anthelmintic, emetic and purgative. The seed is said to be cooling (Wikipedia 2016).

Pointed gourd is provincially known as *patol*. It is a perennial crop and become available during late October onwards, when there is a shortage of other alternative vegetables. Pointed gourd is a good source of minerals, vitamin, especially vitamin A and vitamin C and a good source of carbohydrates as well. It also contains major nutrients and trace elements like magnesium, potassium, copper, sulfur and chlorine which requires in small quantities, but play essential roles in human physiology. The fruit contains 9.0 mg Mg, 2.6 mg Na, 83.0 mg K, 1.1 mg Cu and 17 mg S per 100 g edible part (Wikipedia 2016).

Colloquially, in India, it is often called *green potato*. It is widely cultivated in the eastern and some northern part of India, particularly in North eastern Andhra, Odisha, Bengal, Assam, Bihar, and Uttar Pradesh. It is used as ingredients of soup, stew, curry, sweet, or eaten fried and as *potolerdorma* or *dolma* (dolma) with fish like roe or meat stuffing.

Many people in rural and urban areas fully depend on vegetable cultivation and selling it in the

markets. But it is the matter of deep concern that a remarkable portion of harvested vegetables are being lost due to mismanagement of the vegetables during transit and storage, as a result fungal infection occurs consequently and vegetables are spoiled. For preventing loss of the vegetable it needs proper management of post-harvest disease.

Present investigation was undertaken to evaluate efficacy of selected chemicals, plant extracts and oils to control post-harvest fungal infestation of two common vegetables namely *Trichosanthes anguina* and *T. dioica*. The vegetables were collected from five different markets namely Ananda bazar, Hatirpul bazar, Karwan bazar, Palashi and Segunbagicha of Dhaka city. Five markets were visited for three times to collect the samples. From each market 1kg fresh vegetables were collected randomly during the period of August, 2014 to June, 2015 and were examined mostly for the presence of fungi under Deuteromycetes. The fungi were isolated from samples following the 'Tissue Planting Method' on PDA medium following Islam and Shamsi (2016). Identification of the isolates was done following the standard method and literature (Barnett and Hunter 2000, Booth 1971, Ellis 1971, 1976, Ellis and Ellis 1997, Thom and Raper 1945, Raper *et al.* 1949).

Extract of three plants, two chemicals and three edible oils namely mustard oil, palm oil and soybean oil were selected for evaluating their effect on the vegetative growth of fungi associated with surface of two vegetables *T. anguina* and *T. dioica*. The plant parts, chemicals and oils were collected from Ananda Bazar, Dhaka, near Curzon hall, University of Dhaka. Five hundred gm of each vegetable was taken for each

treatment and control set. Three replications were made for each treatment.

Extract of three plants namely *Allium cepa*, *A. sativum* and *Zingiber officinale* at 20 % *in-vitro* were prepared for the experiment. With sterilized dry cotton, surface of the fresh vegetables was coated by these plant extracts separately at same concentration. Similarly, two chemicals namely sodium bicarbonate and sodium chloride at 20% concentration were selected for the experiment. Surface of the fresh vegetables was coated by two chemicals separately at same concentration with sterilized dry cotton. Mustard oil, palm oil and soybean oil were poured on sterilized Petridishes, applied on the surface of the *T. anguina* and *T. dioica* with sterilized dry cotton. After the treatment it was dried for an hour and was placed in A-4 sized brown envelop carefully and stored at room temperature  $25 \pm 2$  °C in Mycology and Plant Pathology Laboratory, Department of Botany, University of Dhaka for further observations.

In total of 7 species of fungi were isolated from two vegetables. These 7 species belonged to 5 genera of Deuteromycetes. The isolated fungi were *Aspergillus flavus*, *A. fumigatus*, *A. niger*, *Fusarium* sp., *Penicillium* sp., *Rhizopus stolonifer* and *Trichoderma viride*. Islam and Shamsi (2016) reported *Aspergillus niger* as the predominating fungi associated with snake gourd and pointed gourd. Three plant extracts were used on the surface of the fresh vegetables. Plant extract of *Allium sativum* at 20% concentration completely inhibited the vegetative growth of the fungi on fruits of *T. anguina* (Table 1).and *T. dioica* (Table 2).

Table 1. Effect of plant extracts, chemical and oils on vegetative growth of fungi associated with surface of *Trichosanthes. anguina*.

Name of the extracts	Observation on Control at			Observation on Treatments at		
	03 days	07 days	14 days	03 days	07 days	14 days
<b>a) Plant extract</b>						
<i>Allium cepa</i>	+	+	+	-	-	+
<i>A. sativum</i>	+	+	+	-	-	-
<i>Z. officinale</i>	+	+	+	-	-	+
<b>b) Chemical</b>						
Sodium bicarbonate	-	+	+	-	-	-
Sodium chloride	-	+	+	-	-	+
<b>c) Oils</b>						
Mustard		+	+	-	-	-
Palm	-	+	+	-	-	+
Soybean	-	+	+	-	-	+

+ = Presence of fungal growth; - = Fungal growth inhibited

Table. 2. Effect of plant extracts, chemical and oils on vegetative growth of fungi associated with the surface of *Trichosanthes dioica*

Name of the extracts	Observation on Control at			Observation on Treatments at		
	03 days	07 days	14 days	03 days	07 days	14 days
<b>a) Plant extract</b>						
<i>Allium cepa</i>	-	+	+	-	-	+
<i>A. sativum</i>	-	+	+	-	-	-
<i>Z. officinale</i>	-	+	+	-	-	+
<b>b) Chemical</b>						
Sodium bicarbonate	-	+	+	-	-	-
Sodium chloride	-	+	+	-	-	+
<b>c) Oils</b>						
Mustard	-	+	+	-	-	-
Palm	-	+	+	-	-	+
Soybean	-	+	+	-	-	+

+ = Presence of fungal growth; - = Fungal growth inhibited

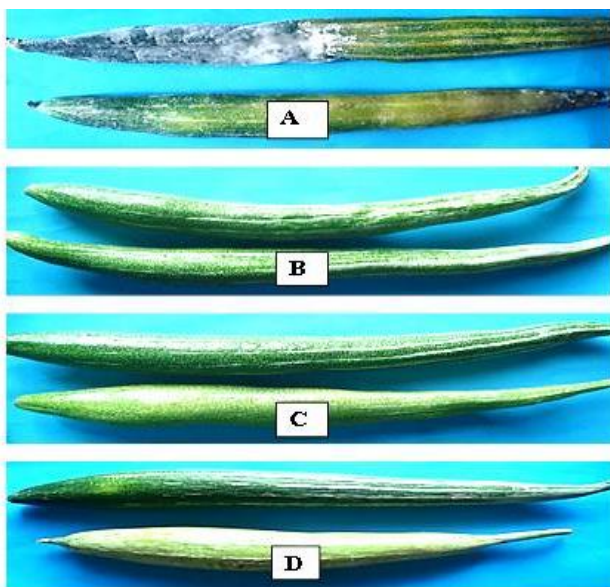


Plate 1. *Trichosanthes anguina*

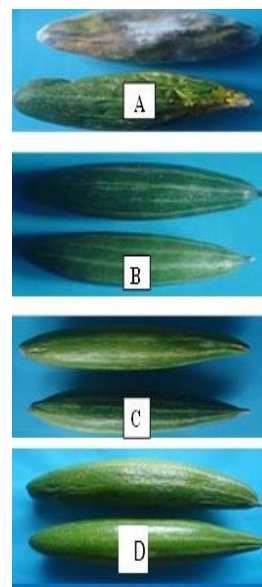


Plate 2 *Trichosanthes dioica*

(A) Control Untreated fruits, (B) Fruits treated with *A. sativum* extract at 20% concentration (C) Fruits treated with sodium bicarbonate at 20% concentration and (D) Fruits treated with mustard oil.

Control sets of *T. anguina* and *T. dioica* showed vegetative growth of fungi within three days of incubation but *A. cepa* and *Z. officinale* treated fruits checked fungal growth up to seven days whereas *A. sativum* treated fruits checked fungal growth on fruit surface up to 14 days of storage (Plate 1. A-B and Plate 2. A-B).

Two chemicals were used on the surface of the fresh vegetables. Sodium bicarbonate at 20% concentration completely inhibited the vegetative growth of the fungi on both the fruit surface up to 14th

day of storage while in case of control the infection started after three days of storage. Sodium chloride also showed complete inhibition of vegetative growth of fungi on fruits up to seven days though the control set showed fungal infestation within three days of storage (Table 1 and 2, Plate 1.A-C and Plate 2. A-C).

Three edible oils namely mustard oil, palm oil and soybean oil were coated on the surface of the fresh fruits separately. Mustard oils checked the vegetative growth of fungi on surfaces of both the fruits up to two weeks. Palm oil and soybean oil

checked fungal growth on fruit surface up to 7 days of storage. Besides, control sets showed fungal infestation within 2 to 3 days of storage (Table 1 and 2, Plate 1.A-D and Plate 2. A-D).

Plant extracts of *A. sativum*, *Sodium bicarbonate* and Mustard oil completely inhibited fungal infestation on fruit surface of *T. anguina* and *T. dioica* up to two weeks of storage. Results of present investigation indicated that spoilage of the vegetables could be reduced with the application of selective and safe plant extracts, chemicals and oils and consequently consumers will get fresh vegetables.

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