



Storage quality and shelf life of horse gram sprouts treated with different forms of garlic

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Abstract : Horse gram is a legume of the tropics and subtropics. Horse gram is an excellent source of iron and molybdenum. Comparatively, horse gram seeds have higher trypsin inhibitor and haemoagglutinin activities and polyphenols than most bean seeds. An experiment was conducted to see the effect of garlic pieces, paste forms on shelf life and quality of horse gram sprouts at Department of Agricultural Microbiology, University of Agricultural Sciences, G.K.V.K., Bengaluru during the year 2009-2011. The results of the experiments showed that the horse gram sprouts treated with garlic paste forms showed more effective than sprouts treated with garlic pieces. Among garlic pieces and paste forms, paste forms showed very less bacterial and fungal population during storage.

Key Words : Garlic, Shelf life, Storage, Sprouts

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INTRODUCTION

Horse Gram (*Macrotyloma uniflorum*) is one of the lesser known beans. The whole seeds of horse gram are generally utilized as cattle feed. However, it is consumed as a whole seed, as sprouts, or as whole meal by a large population in rural areas of southern India. It is mostly used in South Indian states.

Horse gram is a legume of the tropics and subtropics, grown mostly under dry-land agriculture. The chemical composition is comparable with more commonly cultivated legumes. Like, other legumes, these are deficient in methionine and tryptophan. Dehusking, germination, cooking and roasting have been shown to produce beneficial effects on nutritional quality of legumes. Though they require prolonged cooking, a soak solution has been shown to reduce cooking time and improve protein quality. Horse gram is mostly consumed as dhal or sprouts.

MATERIAL AND METHODS

An investigation was conducted in the Department of

Agricultural Microbiology, University of Agricultural Sciences, G.K.V.K., Bengaluru. The horse gram samples were collected from different places. Those collected seed samples were washed and soaked in water for 8 hours at room temperature. Water was drained out and seeds were placed in muslin cloth and tide for sprouting. (Three days for horse gram).

Preparation of garlic paste:

Garlic was selected and was subjected to removal of the outer layer. After removing the outer layer of garlic were made into small pieces. Small pieces of garlic were used for preparation of garlic paste under aseptic conditions by using pestle and mortar.

Shelf life of sprouts of horse gram was studied by treating the sprouts with garlic in the form of pieces and paste for their antimicrobial properties. After treating the sprouts of horse gram with different forms of garlic were packaged in polythene bag of 200 gauge thickness with ventilation by minute holes. The packaged bags were sealed and incubated at room temperature. The observations were

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recorded until the sprouts showed the spoilage symptoms. (upto 7 days)

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Effect of garlic pieces and paste forms on shelf life and quality of horse gram sprouts during storage:

The effect of garlic pieces and paste forms on horse gram sprouts as a biopreservative against spoilage bacteria and fungi was studied and the results are presented in the Table 1.

The horse gram sprouts turned to slightly blackish with hard texture developed on the first day of storage. Slightly odd smell was recorded in untreated sprouts (T_1) *i.e.* control. The sprouts treated with all forms of garlic pieces and paste at all levels turned to odd brown colour, hard texture, no odd smell was obtained.

After three days of storage, the colour of sprouts turned to moderately black, soft texture, odd smell was developed

in untreated sprouts (T_1). The sprouts treated with garlic pieces at all levels developed light black colour, hard texture and slightly odd smell. The sprouts treated with garlic pastes at all levels developed odd brown colour, semi hard texture and no odd smell observed.

After five days of storage, colour turned to completely black, soft texture, odd smell was recorded in untreated sprouts (T_1). The sprouts treated with all levels of garlic pieces, turned to moderately black, soft texture and odd smell was developed. The sprouts treated with all three forms of garlic paste, turned to moderately brown, soft texture and slightly odd smell.

On the seventh day after storage, the colour turned to completely black, soft texture, foul smell was recorded in the untreated sprouts. The sprouts treated with all three forms of garlic pieces turned to completely black colour, soft texture and odd smell was recorded. Sprouts treated with garlic paste at all levels turned to moderately black colour, very soft texture and odd smell was developed. T_7 (5g garlic paste) was the best treatment in all the days. Among garlic pieces and paste forms, paste form showed good results. Similar results have been reported by Manjunath Prasad (1998).

Table 1 : Effect of garlic pieces and paste forms on shelf life and quality of horse gram sprouts during storage

Treatments	Colour	(Storage) days										
		1		3		5		7				
		Texture	Odour	Colour	Texture	Odour	Colour	Texture	Odour	Colour	Texture	Odour
T_1 =Control (s)	01.20	01.10	01.20	02.75	02.50	02.75	03.25	03.75	03.50	05.00	04.6	04.50
T_2 =sprouts+1 g garlic pieces	01.00	01.05	01.00	02.00	02.00	02.00	02.50	02.50	02.75	03.00	03.00	03.50
T_3 =sprouts+2.5 g garlic pieces	01.00	01.00	01.05	01.00	01.00	01.25	01.16	01.16	01.08	02.20	02.38	02.16
T_4 =sprouts+5.0 g garlic pieces	01.00	01.00	01.00	01.08	01.00	01.00	01.00	01.08	01.16	02.12	02.08	02.08
T_5 =sprouts+1 g garlic paste	01.00	01.00	01.00	01.10	02.25	02.00	02.00	02.75	02.75	02.10	03.00	03.00
T_6 =sprouts+2.5g garlic paste	01.00	01.50	01.15	01.00	02.50	01.25	01.16	03.00	01.25	02.08	02.55	02.08
T_7 =sprouts+5 g garlic paste	01.00	02.00	01.25	01.25	02.75	02.00	02.00	03.25	02.25	2.00	04.00	03.50
Colour	Texture		Aroma									
1-2 = brown	1-2 = Hard		1-2 = No odd smell									
2-3 = Colour turned to light black	2-3 = Semi hard		2-3 = Slightly odd smell									
3-4 = Colour turned to moderately black	3-4 = Soft		3-4 = Odd smell									
4-5 = Colour turned to complete black	4-5 = Very Soft		4-5 = Foul smell									

Table 2 : Bacterial and fungal population of horse gram sprouts treated with different concentrations of garlic pieces and paste forms at different intervals during storage

Treatments	Bacterial population ($\times 10^5$ cfug $^{-1}$)				Fungal population ($\times 10^3$ cfug $^{-1}$)			
	1 st	3 rd	5 th	7 th	1 st	3 rd	5 th	7 th
T_1 = Control (s)	-	37.00 ^a	39.00 ^a	41.00 ^a	-	08.00 ^a	12.00 ^a	17.00 ^a
T_2 = Sprouts +1 g garlic pieces	-	33.00 ^a	35.00 ^{ab}	38.00 ^{ab}	-	07.66 ^{ab}	11.00 ^{ab}	15.66 ^{ab}
T_3 = Sprouts + 2.5 g garlic pieces	-	30.00 ^{ab}	33.00 ^{ab}	35.00 ^{ab}	-	06.33 ^{abc}	09.66 ^{ab}	14.00 ^{abc}
T_4 = Sprouts + 5.0 g garlic pieces	-	31.66 ^{ab}	33.00 ^{ab}	34.33 ^{ab}	-	05.66 ^{abcd}	08.33 ^{abc}	12.66 ^{abcd}
T_5 = Sprouts + 1 g garlic paste	-	31.33 ^{ab}	32.00 ^{ab}	35.33 ^{ab}	-	04.33 ^{bcd}	08.00 ^{abc}	11.33 ^{bcd}
T_6 = Sprouts + 2.5 g garlic paste	-	31.33 ^{ab}	30.00 ^b	35.66 ^{ab}	-	03.66 ^{cd}	07.00 ^{bc}	10.33 ^{cd}
T_7 = Sprouts + 5 g garlic paste	-	25.00 ^b	29.00 ^b	31.00 ^b	-	02.33 ^d	05.00 ^c	08.00 ^d
S.E. \pm	-	01.66	01.92	01.93	-	00.75	00.89	01.04
C.D. (P=0.05)	-	05.04	05.83	05.87	-	02.29	02.72	03.17

Aqueous garlic extract has antimicrobial activity against various bacteria like *Bacillus* sp, *E. coli*, *Pseudomonas* sp and *Lactobacillus* sp.

Effect of garlic pieces and paste forms on microbial population of horse gram sprouts during storage:

An experiment was conducted to check the effect of garlic pieces and paste on microbial population of bacteria and fungi of homemade horse gram sprouts at different days and the results are presented in the Table 2.

Three days of storage, horse gram sprouts had the highest bacterial population in T₁ (37×10⁵ cfu/g) which was at par with T₂, T₃, T₄, T₅ and T₆. The lowest bacterial population (25×10⁵ cfu/g) was observed in T₇. But, bacterial and fungal growth was not observed on 1st day.

On third day, the highest fungal population (8×10³ cfu/g) was obtained in T₁, which was at par with T₂, T₃ and T₄. The lowest fungal population (2.3 ×10³ cfu/g) was noticed in T₇.

The highest bacterial population was noticed in untreated sprout sample (39×10⁵ cfu/g) on 5th day which was at par with T₂, T₃, T₄ and T₅. The lowest bacterial population (29×10⁵ cfu/g) was noticed in T₇.

The highest fungal population (12×10³ cfu/g) was found in untreated sprouts on 5th day. This was at par with T₂, T₃, T₄ and T₅ and T₇ recorded the lowest fungal population (5×10³ cfu/g).

After seven days of storage, the highest bacterial population was recorded in T₁ (41×10⁵ cfu/g) which was at par with T₂, T₃, T₄, T₅ and T₆. The lowest population was found in T₇ (31.00×10⁵ cfu /g).

In untreated sprout sample, recorded the highest fungal population (17×10³ cfu /g) which was at par with T₂ and T₃ and T₄. Horse gram sprout sample treated with 5 g of garlic paste found the lowest fungal population (8×10³ cfu /g).

Five per cent garlic extracts caused decrease in the counts of organisms of 1 log cycle within 4 days as observed by El-Khateib and El-Rahman (1987).

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