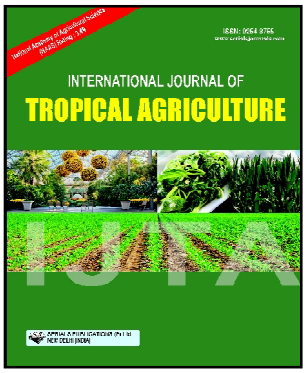

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Role of Ginger Pieces and Paste forms on Shelf life and Quality of Horse gram Sprouts

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Abstract: Ginger is the rhizome of the plant *Zingiber officinale*, consumed as a delicacy, medicine or spice it lends its name to its genus and family (Zingiberaceae). An experiment was conducted to see the effect of ginger pieces and paste forms on shelflife 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 ginger paste were more effective than pieces.

INTRODUCTION

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, though horse gram is an excellent source of iron molybdenum. Comparatively, horse gram seeds have higher trypsin inhibitor and haemoagglutinin activities and polyphenols than most bean seeds. Natural phenols are mostly phenolic acids, namely, 3, 4-dihydroxy benzoic, P-hydroxy benzoic, vanillic, caffeic, P-coumaric, ferulic, syringic and sinapic acids. Dehusking, germination, cooking, and roasting have been shown to produce beneficial effects on nutritional quality of both the legumes. Though both require prolonged cooking, a soak solution has been shown to reduce cooking time and improve protein quality. Moth bean is mostly consumed as dhal or sprouts.

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.

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. (Two days for green gram and three days for horse gram).

Preparation of ginger paste

Ginger was selected and soil particles were removed by washing with water. Then outer peel of ginger was removed. They were made into small pieces. Small pieces of ginger were used for the preparation of ginger paste under aseptic conditions by using pestle and mortar.

Shelf life of sprouts of Green gram was studied by treating the sprouts with ginger in the form of pieces and paste form for their antimicrobial properties. Sprouts were treated with ginger and 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 recorded untill the sprouts showed the spoilage symptoms.

RESULTS AND DISCUSSION

Effect of ginger pieces and paste forms on shelflife and quality of horse gram sprouts during storage

The effect of both ginger pieces and paste application on horse gram sprouts as a biopreservative against spoilage bacteria and fungi on shelf life of sprouts was studied and the results are presented in the Table 1.

One day after storage, the sprouts treated with all levels of ginger pieces and paste had developed odd brown colour, hard texture, no odd smell. The colour turned to light black, semi hard texture and slightly odd smell was recorded in untreated sprouts (T_1).

Three days after storage, sprouts treated with ginger pieces turned to light black, hard texture and slightly odd smell was developed. The sprouts treated with ginger paste at all levels developed odd brown, semi hard texture and no odd smell. The colour turned to moderately black, smooth texture, odd smell was recorded in untreated sprouts (T_1).

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

After seven days of storage, the sprouts treated with ginger pieces at all levels turned to completely black, soft texture and odd smell was developed. The sprouts treated with ginger paste at all levels turned to moderately black, soft texture and odd smell. The colour turned to completely black, soft texture, foul smell was developed in untreated sprouts (T_1). T_7 (5g garlic paste) was the best treatment in all the days. If we compare pieces and paste, paste shows good result.

Effect of ginger pieces and paste on microbial population of horse gram sprouts

An experiment was conducted to find out the effect of ginger 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 after storage, horse gram sprouts, recorded the highest bacterial population in T_1 (35×10^5 cfu/g). The lowest bacterial population (28×10^5 cfu/g) was observed in T_7 and there was no significant difference between the treatments on 3rd day with respect to bacterial population. But, bacterial and fungal growth was not observed on 1st day.

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

Treatments	*(Storage) days*											
	1			*3*			*5*			*7*		
	Colour	*Texture*	*Odour*	*Colour*	*Texture*	*Odour*	*Colour*	*Texture*	*Odour*	*Colour*	*Texture*	*Odour*
T1= Control (s)	01.35	01.20	01.60	02.80	02.75	02.80	03.50	03.90	03.50	05.00	04.50	04.75
T2= Sprouts +1 g ginger pieces	01.00	01.10	01.50	02.75	02.60	01.70	03.25	03.75	02.80	04.50	04.60	04.60
T3= Sprouts + 2.5 g ginger pieces	01.00	01.05	01.35	02.60	02.50	01.65	03.00	03.50	02.50	04.40	04.75	04.50
T4= Sprouts + 5.0g ginger pieces	01.00	01.00	01.20	02.50	02.60	01.50	02.90	03.80	02.25	04.25	04.70	04.25
T5= Sprouts + 1 g ginger paste	01.00	01.10	01.20	02.45	02.80	01.45	02.75	03.95	02.00	03.75	04.80	04.00
T6= Sprouts + 2.5 g ginger paste	01.00	01.50	01.15	02.30	02.95	01.30	02.50	03.80	01.75	03.30	04.95	03.70
T7= Sprouts + 5 g ginger paste	01.00	02.00	01.00	02.10	03.00	01.20	02.25	03.95	01.50	03.00	05.00	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 ginger pieces and paste forms at different intervals during storage

Treatments	*Bacterial population ($\times 10^5$ cfug^{-1})*				*Fungal population($\times 10^3$ cfug^{-1})*			
	1st	*3rd*	*5th*	*7th*	*1st*	*3rd*	*5th*	*7th*
T1= Control (s)	-	35.00^{a}	39.00^{a}	42.00^{a}	-	09.00^{a}	12.66^{a}	16.00^{a}
T2= Sprouts +1 g ginger pieces	-	33.66^{a}	37.00^{ab}	41.66^{a}	-	06.66^{ab}	11.00^{ab}	14.00^{ab}
T3= Sprouts + 2.5 g ginger pieces	-	33.00^{a}	35.00^{ab}	39.00^{ab}	-	06.00^{ab}	09.66^{abc}	12.33^{abc}
T4= Sprouts + 5.0 g ginger pieces	-	32.33^{a}	36.33^{ab}	38.33^{abc}	-	05.33^{ab}	08.00^{bcd}	11.00^{bcd}
T5= Sprouts + 1 g ginger paste	-	31.00^{a}	35.00^{ab}	36.33^{abc}	-	04.66^{ab}	07.33^{bcd}	09.66^{cde}
T6= Sprouts + 2.5 g ginger paste	-	29.00^{a}	31.66^{ab}	33.00^{bc}	-	04.00^{b}	06.66^{cd}	08.00^{de}
T7= Sprouts + 5 g ginger paste	-	28.00^{a}	30.00^{b}	31.33^{c}	-	03.00^{b}	04.00^{d}	06.33^{e}
SEm±	-	01.72	01.61	01.65	-	00.97	00.90	00.92
CD @ 5%	-	05.23	04.89	05.11		02.96	04.00	02.80

On third day, the highest fungal population (9×10^3 cfu/g) was obtained in T_1, which was on par with T_2, T_3, T4 and T_5. The lowest fungal population (3×10^3 cfu/g) was noticed in T_7. There was no significant difference between T_6 and T_7.

The highest bacterial population was noticed in untreated sprout sample (39×10^5 cfu/g) on 5th day which was on par with all other treatments except T_7. The lowest bacterial population (30×10^5 cfu/g) was noticed in T_7.

The highest fungal population (12.66×10^3 cfu/g) was found in untreated sprouts on 5th day which was on par with T_2, and T_3. The lowest fungal population (5×10^3 cfu/g) was observed on 5th day. T_4, T_5, T_6 and T_7 were on par with each other.

After 7 days of storage, the highest bacterial population was seen in T_1 (42×10^5 cfu/g) which was on par with T_2, T_3, T_4 and T_5 and the lowest bacterial population was found in T_7 (31.33×10^5 cfu/g).

The untreated sprout samples recorded the highest fungal population (16×10^3 cfu/g) which was on par with T_2 and T_3. The horse gram sprout sample treated with 5g of ginger paste found the lowest fungal population (6.33×10^3 cfu/g).

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Note: * Originals not seen