

Effect of acidulants on shelf-life quality of chilli (*Capsicum annum* L.) traditional product – *Ranjaka*

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Study was undertaken to know the effect of different acidulants (tamarind and lime juice) on shelf life quality of a traditional product *Ranjaka* from green chillies. Seventeen chilli cultivars (*Capsicum annum* L.) grown during *Rabi* season at green matured stage were subjected to *Ranjaka* preparation and the products were evaluated for shelf life study for six months. The low pungent cultivar product had shelf-life up to fourth month considering all sensory attributes, while the cultivars which had low moisture and high capsaicin could store for six months with good sensory acceptability scores. In case of *Ranjaka* prepared by using tamarind as acidulant only less pungent cultivars were acceptable initially, but at the end of the storage period all the products were found acceptable this could be due to increase in pungency taste acceptability which indicates decline in capsaicin content with natural fermentation process. The addition of tamarind was found better for *Ranjaka* with extended shelf life of more than six months and masking the deteriorated green colour. However, for short term storage (4 months) lime juice can be used for *Ranjaka* preparation. It was observed that, the highly pungent cultivar products acceptability increased for taste with an increase in duration of storage

Key Words : Capsaicin, Moisture, Sensory quality, Chlorophyll, Acidulants

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INTRODUCTION

Chilli has been identified in herbal medicines as one of the purest and most effective natural stimulating botanical since ancient times. Use of chilli in daily life has several health benefits. When taken with food, it stimulates taste buds, increases flow of saliva which contains enzyme amylase that helps in digestion of starchy foods. When eaten fresh with salads they serve as a good vitamin supplements in addition to appetizing property. It is rich in ascorbic acid and also contains vitamin P (ratin) which has antioxidant properties and strengthens blood capillaries and regulates permeability. Green chilli also helps in cancer retardation due to the presence of an enzyme “asparaginase” which is effective when used in pure or isolated form. *Ranjaka* is a type of *Chutney* a traditional product of Northern Karnataka and relished along with meals as an

appetizer. The study was undertaken to know the effect of acidulants on shelf life quality of the product by using different chilli cultivars at green stage.

METHODOLOGY

Seventeen chilli cultivars (*Capsicum annum* L.) of private and public sectors cultivated in the University of Agricultural Sciences, Dharwad during *Rabi* season were selected for the experiment. Freshly harvested matured green chillies were thoroughly washed in clean water to remove dirt and extraneous matter. Further pat dried with clean cloth and were studied for *Ranjaka* preparation by using tamarind and lime juice as acidulants. The selected cultivars were subjected to chemical parameters in triplicates for moisture (AOAC, 1990), ascorbic acid (AOAC, 1990), capsaicin (Palicio, 1977) and total chlorophyll (Bajracharya, 1998).

Chillies were thoroughly washed in water and dried with thin cloth to remove dirt. For product *Ranjaka* (lime juice) preparation, chilli stalks were removed and ground with salt, sugar, lime juice, turmeric, methi powder in electric grinder and for *Ranjaka* (Tamarind), chillies were destalked and ground with salt, tamarind, methi powder, jaggery, turmeric. Immediately

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products were packed and sealed in 200 gauze polyethylene bags. All the prepared products were stored for six months at ambient temperature (33°C - 40°C) for shelf life study. A clean and well ventilated room with adequate amount of light and air was chosen for storage study. Organoleptic evaluation on nine point Hedonic scale was carried out at intervals of one month by selected 20 semi trained panels. The quality parameters were quantified and mean sensory scores of products were computed and statistically analysed by using Completely Randomised Design.

OBSERVATIONS AND ASSESSMENT

The *Ranjaka* product was bright green coloured with pungent acidic taste and soft texture. Sensory quality is a combination of different senses of perception coming into play in choosing and eating any food. The sensory properties include appearance, colour, texture, aroma and pungency acceptance for product evaluation. The mean sensory scores for appearance, colour, flavour, pungency and overall acceptability of green chilli *Ranjaka* with lime juice and tamarind as judged by 20 semi trained panel members during six months of storage are tabulated and graphically presented.

The product prepared from all the cultivars with both lime juice and tamarind were acceptable for appearance, colour, aroma, texture and found highly significant differences between

cultivars initially (Table 1). However, the product of cultivar SH-5 with lime juice was disliked for appearance and texture because of high moisture (91.51%) content and it was more watery in texture. In contrast, SH-5 product with tamarind as acidulant was acceptable both for appearance and texture. Highly significant differences were noticed with respect to pungency taste acceptability. The product of cultivars Byadagi Dabbi, SH-5, Byadagi Kaddi, Devanur Deluxe prepared from both acidulants were acceptable for pungency taste initially and rest were not acceptable due to high capsaicin content (Table 3).

At the end of six months of storage period, all the products prepared from lime juice were disliked for appearance, colour, aroma, texture and overall acceptability except the pungency taste (Table 2). In case of *Ranjaka* prepared out of tamarind, initially, products of less pungent cultivars were acceptable. But, at the end of storage period product of all the cultivars were found acceptable due to decrease in pungency by natural fermentation process. The product of SH-5 cultivar spoiled after second month of storage, this indicate that the shelf life of product was extended by one month with the addition of tamarind compared to lime juice.

With respect to the shelf life quality for six months of period, all the products were initially acceptable in case of *Ranjaka* (lime juice), except the product of the cultivar SH-5

Table 1. Initial mean sensory scores of green chilli *Ranjaka* prepared by using different acidulants

Cultivars	Appearance		Colour		Pungency		Aroma		Texture		OAA	
	L	T	L	T	L	T	L	T	L	T	L	T
Arka Lohit	7.70	7.85	7.15	7.50	5.20	4.40	6.50	7.75	6.65	6.30	6.40	4.40
MSH-11	7.20	7.70	7.30	7.50	4.55	4.25	6.60	7.60	6.60	6.35	6.70	4.65
Arka Harita	6.85	7.80	6.90	7.60	4.65	4.10	6.45	7.35	7.05	6.50	6.70	4.85
G-4	6.90	7.85	7.35	7.85	5.15	5.00	7.20	8.20	7.35	6.50	7.25	5.05
Bydagi Dabbi	8.45	8.40	8.55	8.38	8.90	9.00	8.60	9.00	8.75	7.80	9.00	8.85
Bydagi Kaddi	8.05	8.55	8.15	8.80	8.60	8.65	8.60	9.00	8.70	7.30	8.90	8.85
Pusa Jwala	7.60	8.20	6.55	7.45	4.55	4.70	7.60	8.15	7.80	6.40	7.95	4.85
H.No-9646	7.50	8.15	7.20	7.55	4.45	5.25	7.20	8.00	7.50	6.35	7.50	5.10
Indam-5	7.25	7.90	6.95	8.05	4.40	4.40	7.25	7.90	7.00	6.25	7.00	5.00
Indam-10	7.20	8.15	7.30	7.75	4.80	3.85	7.25	8.00	7.00	6.30	6.80	5.50
Namadari	7.60	8.10	6.95	8.10	4.35	4.90	7.55	8.30	7.40	6.35	7.40	5.40
Godavari	6.90	7.80	7.70	8.40	3.90	4.25	6.25	8.00	6.80	6.40	6.00	5.55
Devanur Deluxe	7.75	8.30	7.55	8.15	7.70	6.45	7.95	8.20	7.90	6.30	7.70	6.70
Hero	7.25	8.05	7.25	8.10	6.25	4.05	6.40	8.30	7.00	6.80	7.15	5.10
SH-5	3.55	7.45	6.30	7.80	8.30	9.00	6.40	8.05	4.35	6.90	4.45	8.50
SH-12	6.75	8.10	7.00	7.55	5.05	4.40	7.35	8.10	6.95	6.55	7.10	4.95
BSS-273	7.00	7.95	7.15	8.05	3.90	4.60	7.15	8.25	7.05	6.60	7.15	5.00
S.E. ±	0.146	0.134	0.137	0.134	0.181	0.191	0.140	0.131	0.146	0.129	0.134	0.131
C.D. (P=0.05)	0.404	0.371	0.380	0.371	0.502	0.529	0.388	0.363	0.404	0.357	0.372	0.363
C.D. (P=0.01)	0.532	0.489	0.501	0.489	0.661	0.697	0.511	0.478	0.532	0.470	0.490	0.478

L – Lime juice T – Tamarind OAA - Overall acceptability

Table 2. Mean sensory scores of green chilli *Ranjaka* prepared by using different acidulants after six months of storage

Cultivars	Appearance		Colour		Pungency		Aroma		Texture		OAA	
	L	T	L	T	L	T	L	T	L	T	L	T
Arka Lohit	4.40	6.90	3.25	6.35	7.40	6.80	3.45	7.20	3.70	6.60	3.50	6.75
MSH-11	4.10	6.20	2.55	6.15	7.30	6.85	4.60	6.75	3.60	6.55	3.75	6.85
Arka Harita	3.60	6.75	2.20	6.35	7.25	6.45	4.20	7.05	3.55	6.00	3.65	6.35
G-4	6.05	6.75	4.30	6.85	7.60	7.35	5.70	7.40	4.45	6.30	3.95	6.80
Byadagi Dabbi	0.00	7.70	0.00	7.00	0.00	8.50	0.00	8.30	0.00	7.45	0.00	7.95
Byadagi Kaddi	5.35	7.50	4.75	7.75	8.25	8.55	5.65	8.45	5.30	7.75	4.65	8.25
Pusa Jwala	5.75	7.30	4.25	6.75	7.40	7.70	4.75	7.45	4.40	7.05	5.30	7.45
H.No-9646	5.55	7.15	2.80	6.45	7.55	6.85	3.55	7.35	3.50	7.10	3.70	7.25
Indam-5	3.50	7.05	2.55	7.20	7.60	6.40	3.45	7.30	3.60	6.50	3.50	6.60
Indam-10	4.00	7.35	3.05	6.50	7.40	6.40	4.20	7.05	3.90	6.55	2.75	6.65
Namadari	4.35	6.90	3.05	6.55	7.40	7.30	4.55	7.75	3.75	7.20	3.25	7.45
Godavari	3.65	7.05	2.95	7.00	7.50	6.70	3.60	7.50	3.60	6.45	3.25	6.60
Devanur Deluxe	0.00	6.95	0.00	6.60	0.00	7.40	0.00	7.60	0.00	6.95	0.00	7.45
Hero	0.00	7.50	0.00	6.80	0.00	7.25	0.00	7.60	0.00	6.70	0.00	6.70
SH-5	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
SH-12	4.05	6.70	2.50	6.50	7.40	6.80	4.60	7.25	4.40	6.65	4.55	6.80
BSS-273	4.10	6.45	2.40	6.45	7.40	6.60	4.00	6.60	4.50	6.30	4.55	6.70
S.E. ±	0.127	0.262	0.112	0.227	0.100	0.404	0.110	0.176	0.110	0.236	0.104	0.196
C.D. (P=0.05)	0.351	0.726	0.312	0.629	0.279	0.532	0.306	0.488	0.306	0.654	0.288	0.523
C.D. (P=0.01)	0.462	0.956	0.410	0.828	0.366	0.196	0.403	0.642	0.403	0.861	0.379	0.715

L – Lime juice T – Tamarind

Table 3. Chemical composition of chilli cultivars at green stage

Sr. No.	Cultivars	Moisture (g %)	Capsaicin* (mg/100g)	Ascorbic acid (mg/100g)	Chlorophyll (mg/100 g)
1.	Arka Lohit	75.40	0.23	145.00	1.28
2.	MSH-11	71.35	0.28	148.33	0.44
3.	Arka Harita	79.32	0.31	155.00	0.57
4.	G-4	77.51	0.36	172.67	1.22
5.	Byadagi Dabbi	89.33	0.07	195.00	0.41
6.	Byadagi Kaddi	76.12	0.09	189.33	0.45
7.	Pusa Jwala	72.55	0.47	198.67	0.27
8.	H. No-9646	77.60	0.33	179.33	0.62
9.	Indam-5	75.39	0.41	142.67	0.58
10.	Indam-10	79.11	0.32	160.67	0.22
11.	Namadari	76.85	0.37	162.33	0.73
12.	Godavari	75.67	0.30	144.00	1.26
13.	Devanur Deluxe	83.09	0.22	142.00	0.91
14.	Hero	82.90	0.25	153.67	0.85
15.	SH-5	91.15	0.06	195.68	0.16
16.	SH-12	80.94	0.31	136.00	0.55
17.	BSS-273	79.70	0.38	156.00	0.75
	S.E. ±	0.082	0.010	2.509	0.032
	C.D. (P=0.05)	0.227	0.027	6.951	0.090
	C.D. (P=0.01)	0.299	0.036	9.156	0.090

*Moisture free basis

which had storage life of only a month and further spoiled due to mould growth (Fig. 1). This was due to high moisture (91.15%) and low capsaicin (0.07 mg/100 g) content (Table 3). The rest of the cultivars which had low moisture (below 80%) had shelf life of four months at ambient temperature.

There was an apparent change in the colour of green *Ranjaka* over storage. The green colour of the product changed to pale brownish green. This can be attributed to the degradation of chlorophyll to pheophytin and also the effect of light and temperature during process of preparation and

storage period. During the storage period the products were packed in 200 gauze LDPE bags and stored at ambient temperature (30-38°C). The effect of light could have degraded chlorophyll of the product. Similar observations were made by Ahmed and Shivhare (2001) in green chilli paste and Ahmed *et al.* (2002) in thermally processed green chilli puree. The authors opined that the loss of chlorophyll in products could be due to the effect of light and temperature on chlorophyll content and also due to degradation of chlorophyll to pheophytin.

Nevertheless, the addition of tamarind was found better

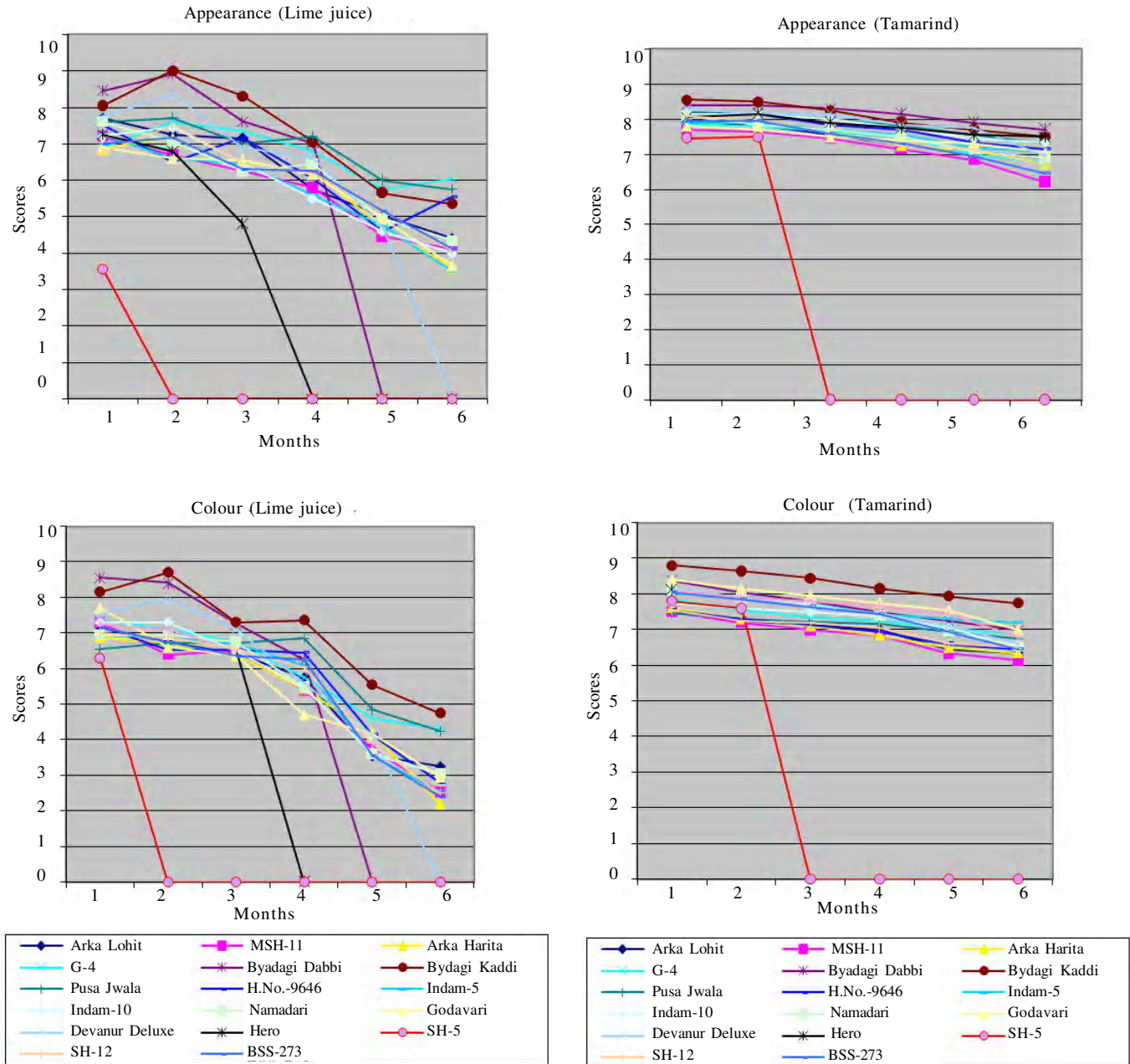


Fig. 1a. Mean sensory scores of green chilli *Ranjaka* prepared using different acidulants for six months of storage

for *Ranjaka* with extended shelf life of more than six months and masking the deteriorated green colour. However, for short term storage (4 months) lime juice can be used for *Ranjaka* preparation (Fig. 1a). The acceptability of chilli *Ranjaka* may also be attributed to the fermented process with the natural micro flora of lactic acid bacteria. Sugar and jaggery added in the *ranjaka* preparation would undergo fermentation resulting in low pH which aid in desired aroma, fermented flavour and

colour stability and reduction in spoilage micro flora (Baysal *et al.*, 1990).

With an advancement of storage period, the scores for pungency acceptability increased indicating that on processing and storage, the capsaicin content of product reduced (Fig. 1b). On the similar line, Ahmed *et al.* (2002b) found that thermal processing of puree for 15 min resulted in 19 per cent loss of capsaicin. The overall acceptability of the product revealed

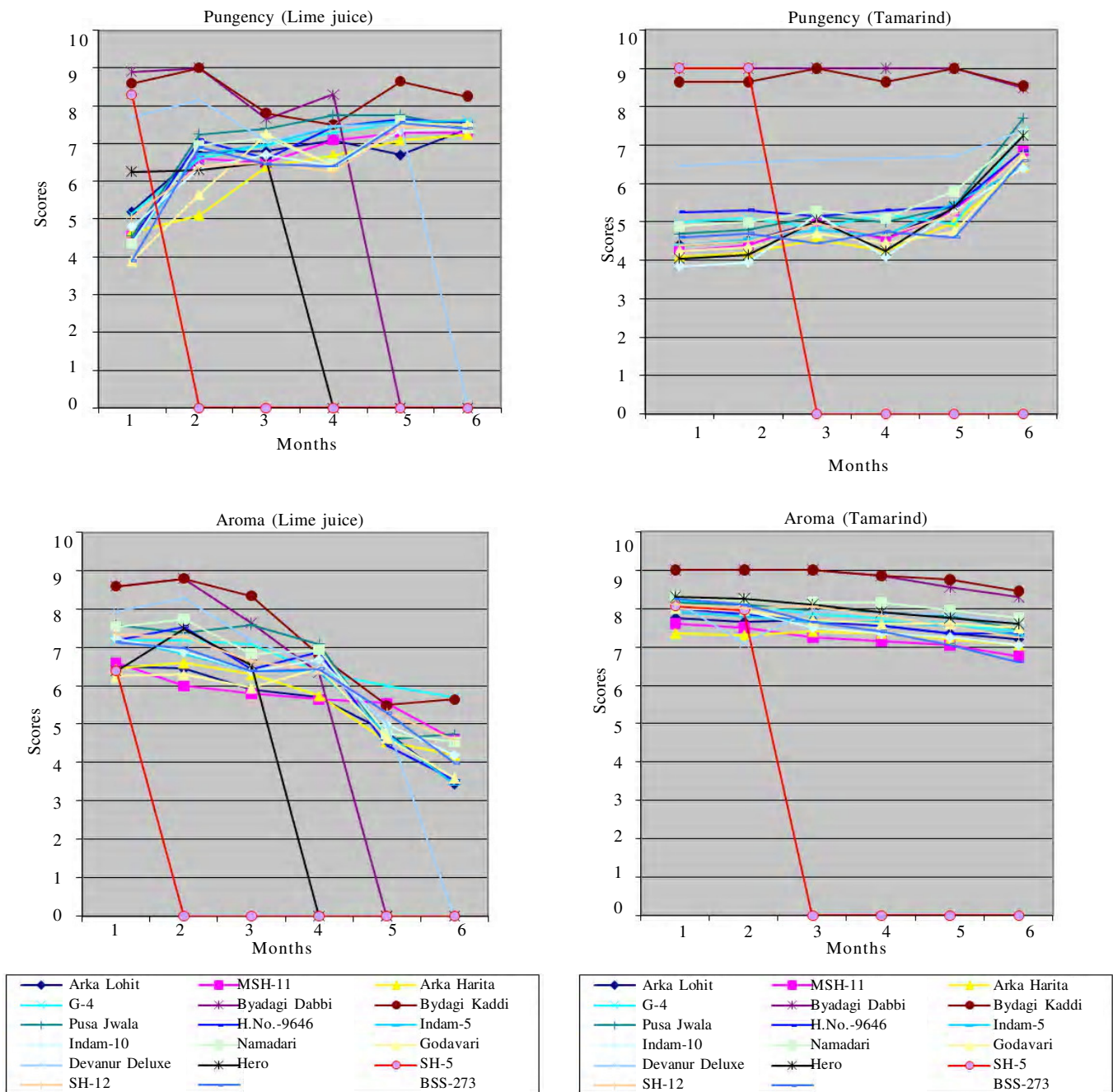


Fig. 1b. Mean sensory scores of green chilli *Ranjaka* prepared using different acidulants for six months of storage

that up to fourth month of storage in all the cultivars investigated was found acceptable (Fig. 1c). Further it showed gradual reduction with an advancement of storage period. However, the products of cultivars SH-5, Hero, Byadagi Dabbi and Devanur Deluxe spoiled after 1, 3, 5 and 6th month after storage, respectively. It was evident that, green chilli *Ranjaka* with lime juice could be stored up to fourth month. Later, there was a reduction in overall acceptability, appearance, colour, aroma

and texture but increase in pungency acceptability was due to reduction in pungency.

The data show that, less pungent cultivars SH-5, Byadagi Dabbi, Devanur Deluxe and Hero spoiled early before the completion of planned storage period, this could be due to the low capsaicin and high moisture which was ranging from 0.06 to 0.25 mg per 100 g and 82.90 to 91.15g per cent, respectively in these varieties. Though the cultivar Byadagi Kaddi was less

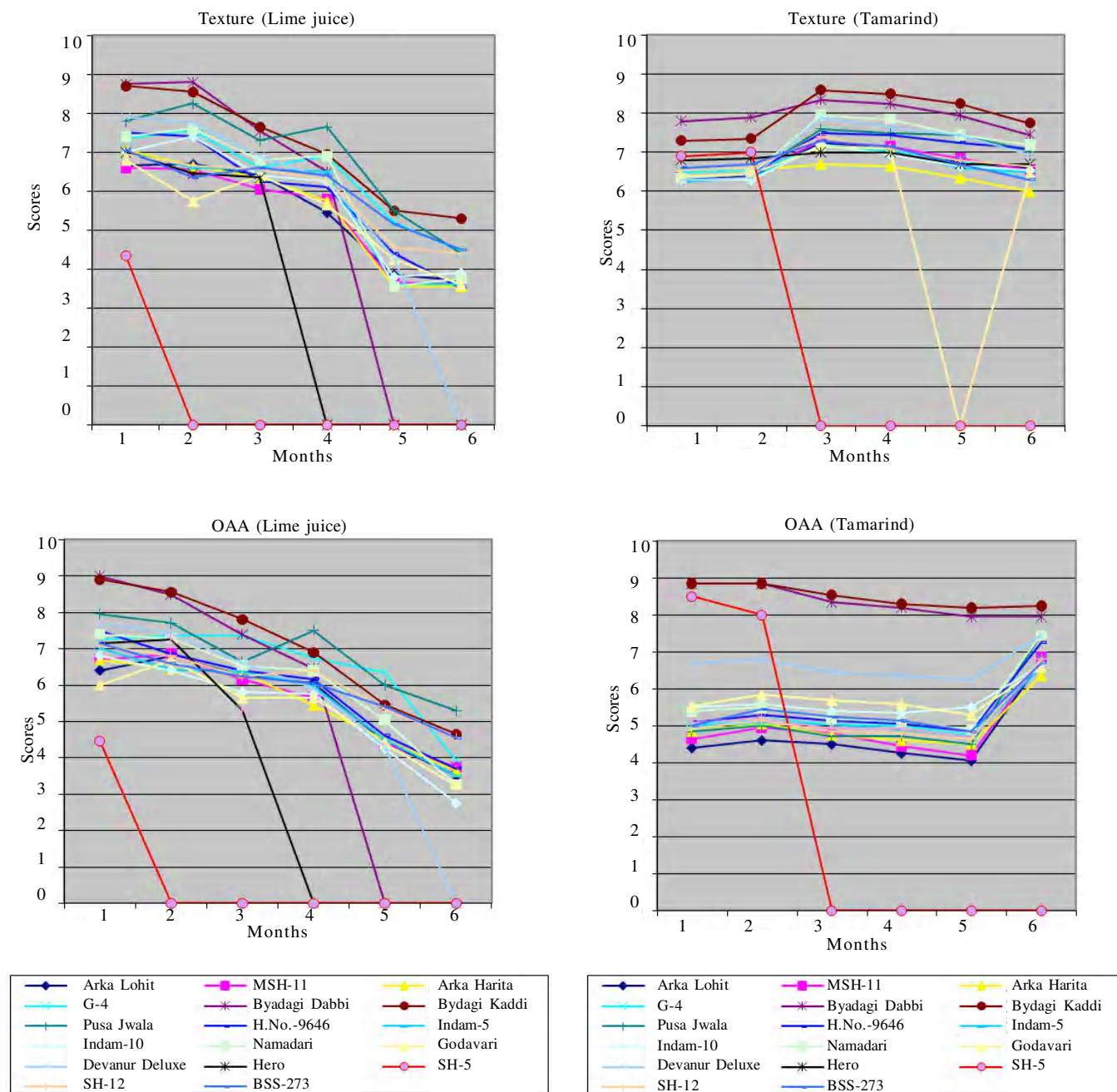


Fig. 1c. Mean sensory scores of green chilli *Ranjaka* prepared using different acidulants for six months of storage

pungent and had more moisture, the product had good shelf-life through out the storage period (Table 3).

Among all the 17 cultivars studied, Byadagi Dabbi and Byadagi Kaddi were found highly acceptable for *Ranjaka* (lime juice and tamarind) .whereas the cultivars Pusa Jwala, H. No. 9646, Namadari and Devanur Deluxe were found acceptable for *Ranjaka* with tamarind. The product of SH-5 cultivar spoiled after second month of storage, this indicate that the shelf life of product was extended by one month with the addition of tamarind compared to lime juice.

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