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EFFECT OF STORAGE DURATION ON CHEMICAL COMPOSITION AND FRACTIONATION EFFICIENCY OF CORIANDER (*CORIANDRUM SATIVUM L.*) LEAF JUICE

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Abstract:

The present study investigates the effect of storage duration on the chemical composition and fractionation efficiency of coriander (*Coriandrum sativum L.*) leaf juice in the green crop fractionation (GCF) process. Fresh coriander foliage, harvested at the pre-flowering stage, was processed to extract leaf juice, which was then stored for varying durations (0–33 hours) at room temperature. The stored samples were analyzed for changes in dry matter (DM), nitrogen (N), and water-soluble reducing sugars (WSRS). Leaf protein concentrate (LPC) was prepared from the juice through heat coagulation at 95°C, while the remaining liquid was collected as deproteinised juice (DPJ).

The study concludes that prolonged storage of coriander leaf juice leads to deterioration in nutrient quality and a marked decline in LPC yield and nutritive value. Therefore, immediate processing of freshly extracted juice is recommended to ensure efficient protein recovery and optimal utilization of the GCF process.

Key words: Green crop fractionation (GCF), Leaf protein concentrate (LPC), Deproteinised Juice (DPJ), leaf extract, Coriander (*Coriandrum sativum L.*),

Introduction:

Green crop fractionation (GCF) is a process in which green plant foliage is macerated and then pressed to extract leaf juice. This juice is subsequently heated to 95°C to produce a leaf protein concentrate (LPC), which serves as a rich source of protein, minerals, and vitamins for human, animal, and poultry nutrition. The remaining liquid after the LPC has been separated from the heated juice is referred to as deproteinised juice (DPJ).

Coriander (*Coriandrum sativum* L.) is an annual herb, belonging to the family Apiaceae. The fresh stem and leaves of coriander are used as an herb for culinary purpose, while the dried fruit is used as a spice. During the present investigation, studies were undertaken on changes in chemical composition of coriander leaf extract which was stored up to 33 h at room temperature. The changes in dry matter (DM), nitrogen (N) and water soluble reducing sugars (WSRS) in the juice, stored for different hours, and in the samples of LPC and DPJ obtained from them were studied.

Methodology for Extraction and Analysis of Coriander Leaf Extract

1. Harvesting and Processing:

Coriander foliage was collected at the pre-flowering stage. The harvested leaves were thoroughly washed with water and macerated into a pulp following the procedure described by Davys and Pirie (1969). The resulting pulp was then pressed to extract the juice, which was collected for further analysis.

2. Storage and Sampling:

The extracted juice samples were stored in conical flasks sealed with cotton plugs for different durations 0, 3, 6, 9, 24, 27, 30, and 33 hours.

3. Analysis:

The Dry Matter (DM) content of the juice was determined by drying samples in an oven at 95°C until a constant weight was achieved. Nitrogen (N) content was measured using the micro-Kjeldahl method (Bailey, 1967), while Water Soluble Reducing Sugars (WSRS) were estimated using Folin-Wu tubes as per Oser (1979).

4. Preparation of Leaf Protein Concentrate (LPC) and Deproteinised Juice (DPJ):

Stored juice samples were used to prepare Leaf Protein Concentrate (LPC) through heat coagulation. The LPC was oven-dried to determine the yield, expressed as LPC-DM per 100 ml of juice. Similarly, the remaining liquid, termed Deproteinised Juice (DPJ), was oven-dried to calculate DPJ-DM per 100 ml of juice. Both LPC and DPJ dry samples were analyzed for their N and WSRS contents using the same methods described above.

5. Statistical Analysis:

All data were statistically analyzed to compute Standard Deviation (SD), Standard Error (SE), and Critical Difference (CD) following the procedures outlined by Panes and Sukhatme (1978) and Mungikar (1997, 2003).

Results and Discussion:

Coriander is a spicy vegetable plant, leaves of which are used as condiment. Tables 1 give an account on changes associated with the storage of coriander leaf juice samples. The % DM in the leaf juice of coriander significantly and gradually decreased from 7.68 to 7.30 %. With the decrease in DM; Nitrogen and WSRS content decreased gradually from 3.65 to 2.82 % and 5.63 to 2.86 % respectively. Thus depletion of dry matter, protein and sugar content was observed during storage of leaf juice from coriander. There was significant decrease in the yield of LPC from coriander juice due to its storage, the values gradually decreased from 2.69 to 2.16 g/100 ml for the yield of LPC, 8.96 to 7.55 % for nitrogen content in LPC and from 0.65 to 0.11 % for the content of soluble sugars (Table 5, Fig. 5). Thus storage of leaf juice resulted in poor yield of LPC with low recovery of nitrogen and sugars in it. The yield of DPJ-DM on the other hand increased from 4.98 to 5.23 % within 24 hours indicating that the release of nutrients during fractionation which were not recovered in LPC. DPJ was with low nitrogen content which ranged from 0.30 % at the beginning to 0.60 % at the end of 33 hours. The soluble sugars however, decreased from 2.58 to 1.37 %. The results, thus gave an indication of deterioration of leaf juice resulting in loss of dry matter and low recovery of nitrogen in LPC, with its lower yield. Madhekar (2025a, 2025b) obtained the same results with the safflower and fenugreek. The deterioration of nutrients was quite slow in the juice of coriander in comparison to these crops which might be due to aromatic compounds and essential oils in the leaves of this plant.

Conclusions:

With the storage of leaf juice samples from coriander, the dry matter (DM), nitrogen (N) in DM and water soluble reducing sugar (WSRS) decreased. The decrease in these contents affected the yield of LPC and DPJ dry matter (DM) as well as their nitrogen and sugar content. On an average, a decline in the yield of LPC-DM per unit volume of the juice was experienced with decreased nitrogen and sugar content in it. Thus, storage of the juice resulted in low recovery of nitrogen in the LPC coupled with its low yield.

It can be thus concluded that storage of the fenugreek leaf juice for more than 3 hours alter its chemical composition leading to low recovery of LPC of poor nutritive value, hence leaf juice should be immediately used for the preparation of LPC to make the process of GCF efficient..

Table 1:- Effect of storage on chemical composition of coriander juice obtained during green crop fractionation

Time of storage (hours)	Juice			Leaf Protein Concentrate (LPC)- Dry matter (DM)			Deproteinised Leaf Juice (DPJ)- Dry matter(DM)		
	% DM	% N	% WSRS	Yield / 100ml	% N	% WSRS	Yield / 100ml	% N	% WSRS
0	7.68	3.65	5.63	2.69	8.96	0.65	4.98	0.30	2.58
3	7.64	3.65	5.40	2.61	8.71	0.55	5.02	0.39	2.15
6	7.62	3.56	5.18	2.49	8.63	0.42	5.12	0.46	2.00
9	7.50	3.32	5.12	2.48	8.46	0.36	5.02	0.48	1.85
24	7.46	3.15	4.87	2.22	8.38	0.29	5.23	0.48	1.74
27	7.36	3.23	4.81	2.19	8.13	0.20	5.16	0.53	1.76
30	7.34	3.15	4.46	2.19	7.88	0.17	5.14	0.61	1.58
33	7.30	2.82	2.86	2.16	7.55	0.11	5.14	0.60	1.37
Mean	7.48	3.31	4.79	2.38	8.341	0.34	5.10	0.48	1.87
S. D.	0.17	0.29	0.86	0.21	0.40	0.19	0.08	0.10	0.41
S. E.	0.06	0.10	0.30	0.07	0.14	0.06	0.02	0.03	0.14
C.D. (p=0.05)	0.14	0.24	0.72	0.18	0.34	0.16	0.04	0.07	0.33

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