RESEARCH PAPER | International Journal of Agricultural Engineering | Volume 12 | Issue 1 | April, 2019 | 96-100
ISSN–0974–2662 ■ Visit us : *www.researchjournal.co.in* ■ **DOI: 10.15740/HAS/IJAE/12.1/96-100**

Studies on physico-chemical properties of multi-flour noodles during storage

■ **Sunil, Neelesh Chauhan, Vipul Chaudhary, Vikrant Kumar and Ratnesh Kumar**

Received : 17.01.2019; **Revised :** 16.02.2019; **Accepted :** 07.03.2019

See end of the Paper for authors' affiliation

Correspondence to :

Sunil
Department of Agricultural Engineering, Sardar Vallabh Bhai Patel University of Agriculture and Technology, Modipuram **Meerut (U.P.) India**
Email : sunilchandelnduat6771@gmail.com

■ **ABSTRACT :** Experiments were conducted to development, quality evaluation and storage stability of multi- flour noodles made from wheat flour, soya bean flour, carrot powder, mushroom flour and apple pomace powder. The noodles were formulated by taking different proportion of multi-flours in the ratio of (T_{100}) 100:0:0:0:0, (T_{90}) 90:2.5:2.5:2.5:2.5, (T_{80}) 80:5.0:5.0:5.0:5.0, (T_{70}) 70:7.5:7.5:7.5:7.5, (T_{60}) 60:10:10:10:10 and (T_{50}) 50:12.5:12.5:12.5:12.5 respectively. Wheat flour of the ratio of 100:0:0:0:0 was considered as control. All the samples were packed in high density polyethylene (HDPE) and stored at room temperature from 0 to 60 days for quality evaluation. After preparation of noodles various physico-chemical properties were determined, *i.e.*, moisture content, ash content, protein content and fat content.

■ **KEY WORDS :** Multi- flour, Noodles, High density polyethylene

■ **HOW TO CITE THIS PAPER :** Sunil, Chauhan, Neelesh, Chaudhary, Vipul, Kumar, Vikrant and Kumar, Ratnesh (2019). Studies on physico-chemical properties of multi-flour noodles during storage. *Internat. J. Agric. Engg.*, **12**(1) : 96-100, **DOI: 10.15740/HAS/IJAE/12.1/96-100.**

Noodles are widely consumed throughout the world and their global consumption is second only to bread. Instant noodles are widely consumed throughout the world and it is a fast growing sector of the noodle industry (Owen, 2001). This is because instant noodles are convenient, easy to cook, low cost and have a relatively long shelf-life. The instant noodles is a product made from a dough prepared from wheat flour and water, with or without other optional ingredients, kneaded, extruded through an extrusion press fitted with a die of the desired size, pre-cooked in boiling edible oil, cooled and packed. The information on final product quality and the factors affecting quality are extremely limited in the scientific literature (Kruger *et al.*, 1998). Among ready to eat foods, noodles form an important part of Indian dietary. These products are rich in starch, fat and energy but depleted in fibre. Various epidemiological studies have shown that the diet lacking in fibre may be the cause of various gastrointestinal and cardiovascular diseases (Kumari and Grewal, 2007). The growth of bakery industry is about 10 per cent per annum and the products are increasingly becoming popular among all sections of people (Indrani *et al*., 1997).

Nutritionally, wheat flour is a good source of protein, carbohydrate and dietary fibre. Generally, research on noodles making are based on their quality of product which is produced from wheat flour since it may vary widely on its protein content (Habernicht *et al*., 2002). Soybean [*Glycine max* (L.) Merr.] is one of the most important crops that have the potential to provide the world's increasing demand of food. The soybean a grain legume is one of the richest and cheapest sources of

protein that can be used to improve the diet of millions of people, especially the poor and low income earners in developing countries (LIU, 2000). Defatted soy flour at 2-5 per cent improves water holding capacity and sheeting process of dough. The enhanced sheeting strength produces better layering during the fat roll in process and more tender and finished product. Carrot is a rich source of β-carotene and contains other vitamins, like thiamine, riboflavin, vitamin B-complex and minerals (Walde *et al*., 1992). Dried carrot has β-carotene and ascorbic acid in the range of 9.87 to 11.57 mg and 13.53 to 22.95 mg per 100 g, respectively (Upadhyay *et al*., 2008). Drying or dehydration is the useful means to increase the shelf-life of perishable food for further use (Roberts *et al.,* 2008). Apple pomace is, therefore, becoming very popular and can be incorporated into food products to develop functional foods. It has been found that 30 per cent formulation was better in taste, texture and appearance. Apple pomace was also used in bakery products by (Yadav and Gupta, 2015). Incorporating pulse flour into food items is not a new concept. Considerable research work exist that examines the addition of pulses to baked goods such as breads (Dalgetty and Baik, 2006), cookies and cakes (Gomez *et al*., 2008) as well as pasta (Cabello *et al.,* 1992), snack products (Hardacre *et al*., 2006).

METHODOLOGY

The experiments were conducted to develop multi-flours noodles and its physico-chemical quality during storage. Multi- flour comprising wheat flour, soya bean flour, carrot powder, mushroom flour and apple pomace powder were used for the present study. The noodles were formulated using various proportions of flours and other ingredients. All the experiments were conducted in food analysis laboratory and bakery laboratory in the Department of Agricultural Engineering. Multi-flours noodles were packaged in HDPE at room temperature and analyze the physico-chemical characteristics like moisture content, ash content, protein and fat content. The physico-chemical characteristics were done as fresh and as well as during storage for 60 days.

Development of multi-flour noodles:

Multi-flours noodles were prepared by incorporating different levels of flours *viz.*, wheat flour, soyabean flour, carrot powder, mushroom flour and apple pomace powder blends in ratio of (T_{100}) 100:0:0:0:0, (T_{90}) 90:2.5:2.5: 2.5:2.5, (T_{80}) 80:5.0:5.0:5.0:5.0, (T_{70}) 70:7.5:7.5:7.5:7.5, (T_{60}) 60:10:10:10:10 and (T_{50}) 50:12.5:12.5:12.5:12.5, respectively. All the materials were mixed by hand until firm dough was formed. The dough was rolled out in a baking tray and cut into round in shape with a mould. The noodles were placed in greased aluminum trays and semi drying in tray dryer. After semi dried the noodles were taken out of dryer and cooled at room temperature. At last, the cooled noodles were packed into HDPE bags and stored at room temperature for further studies.

Estimation of physico-chemical characteristics of noodles:

Moisture content, ash content, protein content and fat content were determined in all the six types' ratio of noodles.

Moisture content:

Moisture content of noodles was determined by hot air oven method. Following formula was used to estimate moisture content of samples.

$$\text{Moisture content (wb\%)} = \frac{\text{Loss in weight of sample}}{\text{Initial weight of sample}} \times 100$$

Ash content

Muffle furnace (TANCO model) was used to determine the ash content of the samples.

Following formula was used to calculate the ash content of the samples.

$$\text{Ash content (wb\%)} = \frac{\text{Final weight of ash}}{\text{Initial weight of sample}} \times 100$$

Protein estimation:

Protein was analytically estimated by determining the amount of total nitrogen in the sample (AOAC, 2000).

Amount of protein in sample = Total nitrogen (%) x 6.25

Fat estimation:

Fat was estimated using the formula:

$$\text{Fat content (\%)} = \frac{\text{Weight of residue left}}{\text{Weight of sample taken}} \times 100$$

RESULTS AND DISCUSSION

The studies were conducted on development and quality evaluation of multi-flour noodles by incorporating various proportions of flours. e.g., wheat flour, soyabean

flour, carrot powder, mushroom flour and apple pomace powder. The quality of the fresh multi-flour noodles were evaluated on the basis of physico-chemical characteristics like moisture content, ash content, protein content and fat content.

Effect on moisture content:

The data for variation in moisture content (%) of noodles during storage is presented in Fig.1. The moisture content of noodles samples varied from 7.65 to 8.28 percent during storage periods. The values of moisture content for freshly prepared noodles was highest for T_{100} noodles (8.12 %) followed by T_{90} (8.08 %), T_{80} (8.01%), T_{70} (7.60 %), T_{60} (7.50 %) and T_{50} (7.45 %). The moisture content of composite flour noodles were less as compared to control noodles which indicates that the moisture content of composite flour noodles decreased with increase in the incorporation of soy bean flour, carrot powder, mushroom powder and apple pomace powder. The moisture content ranged for noodles T_{100} (8. 12 - 8.28 %), T_{90} (8.08 - 8.26 %). T_{80} (8.01 - 8.12 %), T_{70} (7.60 - 7.72 %), T_{60} (7.50 - 7.68 %) and T_{50} (7.45 - 7.65 %) during storage. Similar trends were found by Mustafa *et al*. (1986) where in increase in moisture content with increase the ingredients.

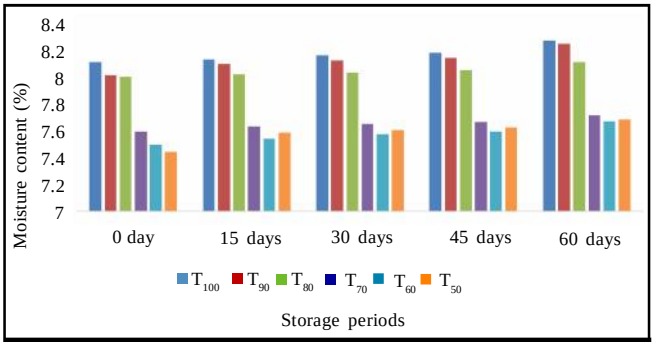

Fig. 1 : Effect of multi- flour noodles on moisture content (%) during storage period

Effect on ash content:

The data for variation in ash content (%) of wheat flour and composite flour noodles stored at room condition upto 60 days are presented in Fig. 2. The ash content for fresh noodles ranged from 2.0 to 2.30 per cent during storage with respect to incorporation of composite flours. The ash content was observed highest for freshly prepared noodles T_{50} (2.30%) followed by T_{60} (2.29 %), T_{70} (2.28 %), T_{80} (2.20 %), T_{90} (2.15 %) and control noodles T_{100} (2.0%). The results indicate that the ash content increased with increase ratio of different flours with wheat flour. Ash content gradually increased in the range from T_{100} (2.0 to 1.95%), T_{90} (2.15 to 2.08%), T_{80} (2.20 to 2.13%), T_{70} (2.28 to 2.20%), T_{60} (2.29 to 2.23%) and T_{50} noodles (2.30 to 2.25%) during storage period. Similar trends were found by Agu *et al*. (2007).

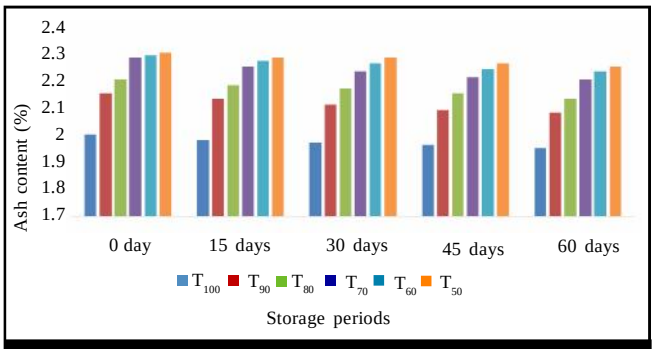

Fig. 2 : Effect of multi- flour noodles on ash content (%) during storage period

Effect on protein content:

The data for variation in protein content (%) of noodles during storage periods under room condition are presented in Fig. 3. Protein content for freshly prepared noodles among all incorporation of flours were observed for noodles T_{100} (11.87%), T_{90} (12.03%), T_{80} (12.28%), T_{70} (12.43%), T_{60} (12.58%) and T_{50} (12.68%). The protein of noodles decreased with increase in the storage period for noodles T_{100} (11.87 % to 11.81 %), T_{90} (12.03 % to 11.95%), T_{80} (12.28 % to 12.21%), T_{70} (12.43% to 12.32%) and T_{60} (12.58% to 12.53%), T_{50} (12.68 % to 12.62%) during 60 days of storage periods. Highest

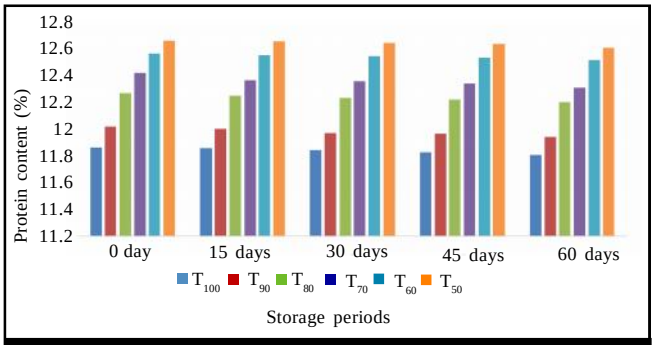

Fig. 3 : Effect of multi- flour noodles on protein content (%) during storage period

protein observed in T_{50} noodles as compared to others during storage. Whereas, T_{100} noodles reported lowest protein content. Similar trends were found by Agu *et al*. (2007).

Effect on fat content:

The data for variation in fat content (%) of noodles during storage periods are presented in Fig.4. The fat content of fresh noodles were observed for noodles T_{100} (4.82%), T_{90} (5.02%), T_{80} (5.10%), T_{70} (5.18%), T_{60} (5.26%) and T_{50} (5.32%). The results revealed that the fat content of noodles increased with increase in the incorporation of soya bean, carrot, mushroom flour and apple pomace powder. Fat content of control noodles was decreased with increasing the storage periods. Similar trends were also found in other noodles. The fat content was observed for T_{100} noodles (4.82% to 4.77%) followed by T_{90} (5.02% to 4.98%), T_{80} (5.10% to 5.05%), T_{70} (5.18% to 5.14%), T_{60} (5.26% to 5.19%) and T_{50} (5.32% to 5.28%) upto 60 days of storage periods. The study revealed that fat content gradually decreased as increased in storage period under ambient condition. The fat content of composite flour noodles incorporated soya bean, carrot, mushroom and apple pomace powder with wheat flour was observed higher as compared to control noodles. Similar trends were found by Anu and Kawatra (2007).

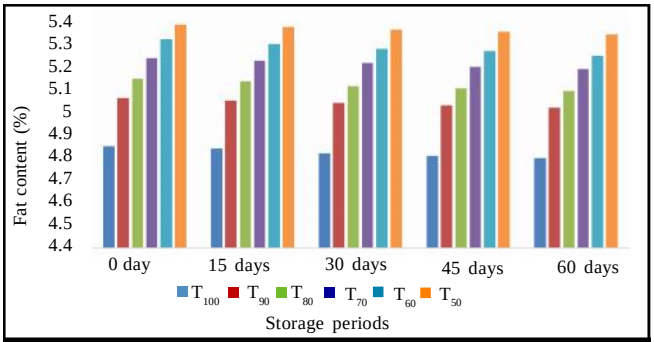

Fig. 4 : Effect of multi- flour noodles on fat content (%) during storage period

Conclusion:

Incorporation of soy bean flour, carrot powder, mushroom powder and apple pomace powder into wheat flour for the development of noodles is possible based on the physico-chemical properties of the noodles. The results revealed that the incorporated noodles had the highest physico-chemical properties during the storage compared to control treatment. Therefore, the treatment (T_{50}) has highest physico chemical properties for 60 days stored at room temperature.

Authors' affiliations:

Neelesh Chauhan, Vipul Chaudhary, Vikrant Kumar and Ratnesh Kumar, Department of Agricultural Engineering, Sardar Vallabh Bhai Patel University of Agriculture and Technology, Modipuram, **Meerut (U.P.) India (**Email : balwants651@gmail.com;vkvk6096@ gmail.com**)**

REFERENCES

Agu, H.O., Ayo, J.A. Paul, A.M. and Folorunsho, F. (2007). Quality characteristics of biscuits made from wheat and African breadfruit (*Treculia africana*). *Nigeria Food J.*, **25 (2)**: 19-27.

Anu, S.S. and Kawatra, A. (2007). Use of pearl millets and green gram flours in biscuits and their sensory and nutritional quality. *J. Food Technol.*, **44**(5): 554-563.

AOAC (2000). *Official method of analysis*.17th Ed. The Association: Washington, D.C., U.S.A.

Cabello, C.S., Uebersax, M.A. and Occena, L.G. (1992). Assessment of bean flour in conventionally cooked and microwave-prepared pasta. *Michigan Dry Bean Digest.*,**16**: 7-9.

Dalgetty, D.D. and Baik, B.K. (2006). Fortification of bread with hulls and cotyledon fibres isolated from peas, lentils and chickpeas. *Cereal Chem.*, **83**: 269-274.

Gomez, M., Oliete, B., Rosell, C.M., Pando, V. and Fernandez, E. (2008). Studies on cake quality made of wheat-chickpea flour blends. *Food Sci. Technol.*, **41**: 1701-1709.

Habernicht, D.K., Berg, J. E. , Carlson, G. R. and Bruckner, P.L. (2002). Pan bread and a Chinese noodle quality in hard winter wheat genotypes growth in water limeted environment. *J. Crop Sci.*, **42**: 1396-1403.

Hardacre, A.K., Clark, S.M., Riviere, S., Monro, J.A. and Hawkins, A.J. (2006). Some textural, sensory and nutritional properties of expanded snack food wafers made from corn, lentil, and other ingredients. *J. Text. Stu.*, **37**: 94-111.

Indrani, S., Savithri, G.D. and Venkateswara, R.G. (1997). Effect of defatted soy flour on the quality of buns. *J. Food Sci. Technol.*, **34** : 440–442.

Kruger, J.E., Hatcher, D.W. and Anderson, M.J. (1998). The effect of incorporation of rye flour on the quality of oriental noodles. *Food Res. Internat.*, **31**(1): 27-35.

Kumari, S. and Grewal, R. B. (2007). Nutrtional evaluation

and utilization of carrot pomace powder for preparation of high fibre biscuits. *J. Food Sci. & Technol.*, **44** (1): 56-58.

LIU, K. (2000). Expanding soybean food utilization. *Food Technol.*, **54** (7): 46-47.

Mustafa, A.B., Harper, D.B. and Johnson, D.E. (1986). Biochemical changes during ripening of some sudense date varities. *J. Sci. Food & Agric.*, **37** : 43-53.

Owen, G. (2001). *Cereal processing technology*. Cambridge: Wood head publishing.

Roberts, J.S., Kidd, D.R. and Zakour, O.P. (2008). Drying kinetics of grapes seeds, *J. Food Engg.*, **89**: 480-465.

Upadhyay, A., Sharma, H.K. and Sarkar, B.C. (2008). Characterization and dehydration kinetics of carrot pomace. Agricultural Engineering International: *The CIGR e-J., Manuscript FP,* 07-35. **10**.

Walde, S.G., Math, R.G., Chakkarvarthi, A. and Rao, D.G. (1992). Preservation of carrots by dehydration techniques-*A review. Indian Food Packer*, **46** : 37– 42.

Yadav, S. and Gupta, K.R. (2015). Formulation of noodles using apple pomace and evaluation of its phytochemicals and antioxidant activity. *J. Pharmacognosy & Photochemistry,* **4** (1) : 99-106.