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Studies on drying of green chilli in dehumidified air dryer

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SUMMARY :

The green chilli were washed and cut into 5-7 mm long pieces. This pieces were dried in dehumidified air dryer after pretreatments namely control, blanching and sulphitation (0.5 % of KMS). Green chilli dried in dehumidified air dryer from its initial moisture content 516.84-624.11 per cent (db) to final moisture content 8.61-9.85 per cent (db). The drying rate was faster in blanched samples as compared to other samples. The dehydration ratio was found to be less in control and sulphited sample as compared to blanched sample. The rehydration ratio of blanched sample was found to be lowest as compared to other sample. Green chilli dried in dehumidified air dryer was found to be better on the basis of sensory evaluation.

KEY WORDS : Drying, Chilli, Pre-treatment, Heat pump

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Chilli (C*apsicum annum* L.) is an important condiment and cash crop in the world. It is virtually an indispensable item in the kitchen for everyday cooking. Dried and green chillies are used to impart pungency of various foods.

Chilli is generally harvested at very high moisture content ranging from 700 to 800 % (d.b.) and dried to very low moisture content of 8-10 % (db) for storage and 4-5 %(db) for grinding purposes (Pruthi, 1993; Miaruddin *et al*., 1995). It is essential to dry the chilli in a suitable environment to produce good quality (colour and pungency) dried product.

The conventional drying method for chilli is sun drying and remains the most practical method through out chilli producing countries. This method usually takes more than five days, depending on the weather condition, to obtained required moisture content. The most common changes that occurs during hot air drying of green vegetables and spices is the conversion of chlorophyll to pheophytins and loss of aroma (Rocha *et al.*, 1993). Processing methods and storage conditions affect the quality of chilies. The retention of naturally coloured pigments in thermally processed stored food has been a major challenge in food processing (Ihl *et al.*, 1998).

Drying at low temperature to enhance the quality of food products has been a growing interest in recent years. Heat pump have been known to be energy efficient when used in conjunction with drying operation (Chau *et al.*, 2002). Pal *et al.* (2008) proposed to dry the green sweet paper at 35°C in a heat pump to obtain an acceptable product.

The objectives of this experiment was to study the effect of pretreatments on the quality of dried green chilli in dehumidified air dryer.

EXPERIMENTAL METHODS

Freshly harvested green chilli were directly procured from farmer's field. The green chillies were washed under tap water

to remove adhering impurities and then cut into 5-6 mm long pieces. Sample size 450-500 g was taken for the experiment. Pre-drying treatments is necessary prior to drying to check the discoloration of sample during drying. For blanching of chilli, sample was placed in the hot water (90°C) 0 for 2 minute. Then immediately immersed in cold water to avoid further thermal stresses and surface water was removed by spreading on perforated tray. Sulphitation of the sample was done by soaking the chilli in 0.5% KMS solution for 5 min.

A laboratory dehumidified air dryer with chamber of 73x 51 x 56 cm and one tray (50 x 48 cm) was used to dry chilli. The velocity of the drying air was kept 0.3 m/s constant. The drying air temperatures was maintained between 35-40°C. Samples were weighed at every 30 minutes interval till the desired moisture content was achieved. Water activity of the sample was measured by water activity meter (Aqualab LITE Decagon devices, Inc).

The moisture content of the sample was determined by hot air oven method (Ranganna, 2000). The rehydration ratio and dehydration ratio of the sample was determined by standard method (Kim *et al.*, 1987). Sensory evaluation was carried out by a panel of ten judges for different attributes *viz.*, colour, texture, taste were rated on the basis of a 9-point Hedonic scale (BIS, 1972).

EXPERIMENTAL FINDINGS AND ANALYSIS

The results obtained from the present investigation as well as relevant discussion have been summarized in the Table from 1 to 2.

Drying characteristics :

The average initial moisture content of control, blanched and sulphited sample of green chilli in dehumidified air dryer were 475.495, 494.33 and 595.15 per cent (d.b.), respectively. It can be observed from Table 1 that the total drying time required to complete drying of blanched sample in dehumidified air dryer was less than that of sulphited sample. Drying time required for control and sulphited sample in dehumidified air drying was found to be 1170 minutes. The average final moisture content of control, blanched and sulphited sample in Fig. 1

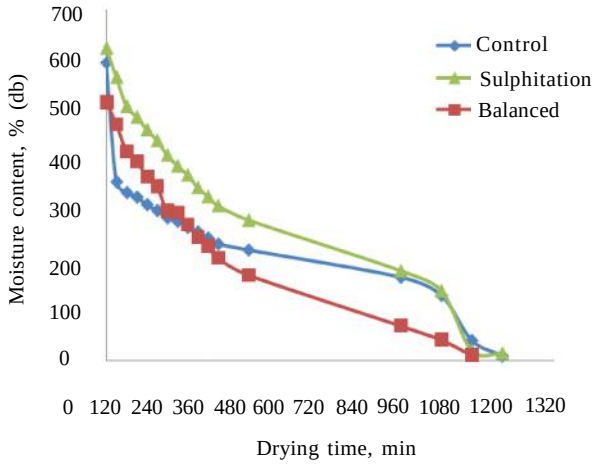

Fig. 1 : Variation in moisture content with drying time of green chilli during dehumidified air drying at different pre-treatments

Fig. 1 shows effect of pre-treatments on drying of green chilli in dehumidified air dryer. Fig. 1 clearly shows that removal of moisture during dehumidified air drying in blanched sample was faster as compared to sulphited and control sample. Removal of moisture with respect to time in control and sulphited sample was found to be at par.

Drying rate versus moisture content :

Variation of drying rate as a function of moisture content at different pre-treatments for green chili are shown in Fig 2. Drying of green chilli took place mainly under falling rate period. During this period migration of moisture occurred through the mechanism of diffusion, as the drying of green chilli occurred relatively faster rate, amount of water available at the surface soon became inadequate to maintain the supply and rate rapidly

Table 1 : Drying time, moisture content (% db), water activity, rehydration and dehydration ratio of green chilli

Pre-treatment	Temp. range (°C)	Total drying time (min.)	Moisture content, % (db)		Water activity		Rehydration ratio	Dehydration ratio
			Initial	Final	Initial	Final		
Control	35-40	1170	594.80	8.75	0.959	0.152	2.76	4.69
Blanched		1080	516.84	9.85	0.965	0.143	2.66	5.61
Sulphited		1170	624.11	8.61	0.965	0.145	2.79	3.70

Table 2 : Sensory attributes of dehumidified air dried green chilli

Pre-treatment	Colour	Texture	Taste
Sulphited	8.5	8.5	8.5
Control	8.4	8.5	8.5
Blanched	3.5	8.0	6.5

declined to a value control by liquid diffusion within the slices. Similar results were reported by Pal *et al.* (2008) for drying of sweet paper and Bakane *et al.* (2005) for drying of mushroom. The Fig. 2 clearly shows that blanched sample had higher drying rate and faster moisture removal due to disruption of its matrix and possible loss solids during blanching, resulting in the easier diffusion of moisture from core of the products. Same results were also obtained by Bakane *et al.* (2005) during drying of mushroom. Though the treated sample had low drying rate initially in both the drying methods, the drying rates were more or less same for all the samples at the later part of the drying. This might be due to case hardening in all the samples at later stage of drying limiting the movement of moisture from inside.

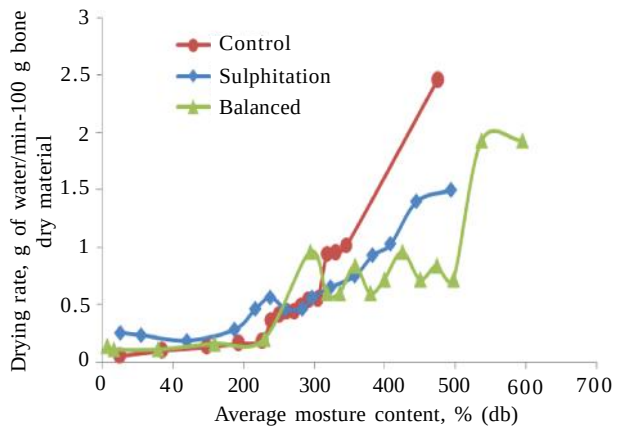

Fig. 2 : Relation between drying rate and average moisture content of green chilli during dehumidified air drying at different pre-treatments

Dehydration and rehydration ratio :

The dehydration ratio of green chilli samples dried in dehumidified air dryer for control, blanched and sulphited samples were found to be 4.69, 5.61 and 3.70, respectively. The dehydration ratio was found to be less in control and sulphited sample as compared to blanched sample. This might be due to higher value of residual moisture content after dying which adds to the weight of sample. The dehydration ratio of treated samples were observed to be highest owing to a higher initial moisture content and removal of outer waxy skin, which promotes moisture removal during drying.

The rehydration ratio was observed for control, blanched and sulphited were 2.76, 2.66 and 2.79, respectively for dehumidified air drying. The rehydration ratio of blanched sample was found to be lowest as compare to other samples. The elasticity of cell wall and swelling power, which are important for good rehydration were reduced during blanching hence the lower rehydration ratio of blanched samples were observed. Kotwaliwale *et al.* (2007) reported that pre-drying treatments have significant effect on the hardness of rehydrated mushroom. Hardness of the blanched rehydrated mushroom was significantly more than that of control and sulphited.

Water activity :

Water activities means water available for growth of microorganism. Data depicted in Table 1 indicates that water activity of control samples (0.152) was highest followed by sulphited (0.145) and lowest in blanched samples (0.143). It shows that microbial growth will be less in blanched sample as compared to others samples.

Sensory attributes :

The mean sensory score for different quality attributes of dried chilli are presented in Table 2. Colour score of blanched samples was found to less as compared to other samples. Texture and taste score were also less in blanched samples. Therefore, it indicates that blanching is not suitable in green chilli drying. Similar work related to the topic was also done by Gupta *et al.* (2003); Hossain and Bala (2007); Joy *et al.* (2001); Lee and Kim (2009) and Papakumari *et al.* (2003).

LITERATURE CITED

BIS (1972). Specification for Dehydrated Peas. IS: 4624, Bureau of Indian Standards: NEW DELHI (INDIA).

Bakane, P.H., Patel, S. and Kotwaliwale, N. (2005). Effect of pretreatment and drying ait temperature on the quality of dehydrated oyster mushroom. *Pleurotus sajor-caju. Mushroom Res.*, **14**(1) : 25-31.

Chau, K.J., Chou, S.K., Ho, J.S. and Hawlader, M.N.A. (2002). Heat pump drying: Recent developments and future trends. *Drying Technol.*, **20**(8) : 1579-1610.

Gupta, P., Ahmed, J., Raghavan, G.S.V. and Shivhare, U.S. (2003). Drying characteristics of red chilli. *Agricultural Engineering* Abstracts, **20**(10) : 1975-1987.

Hossain, M.A. and Bala, B.K. (2007). Drying of hot chilli using solar tunnel drier. *Internat. J. Food Sci. & Technol.*, **81**(1) : 85-92.

Ihl, M., Monslaves, M. and Bifani,V. (1998). Chlorophyllase inactivation a measure of blanching efficacy and colour retention of artichok (*Cynara scolymus* L.). *Lebensm-Wiss Technol.*, **31** : 50-56.

Joy, C.M., George, P.P. and Jose, K.P. (2001). Solar tunnel drying of red chillies. *J. Food Sci. & Technol.*, **38**(3) : 213-216.

Kim, H.C., Bishnoi, P.R., Hedemann, R.A., Rizvi, S.S.H. (1987). Kinetics of methane hydrate decomposition. *Chem. Engg. Sci.,* **42**(7): 1644-1653.

Kotwaliwale, N., Bakane, P. and Verma, A. (2007). Changes in textural and optical properties of oyster mushroom during hot air drying. *J. Food Engg.,* **78** (4) : 1207-1211.

Lee, Kong Hoon and Kim, Ook Joong (2009). Investigation on drying performance and energy saving of the batch –type heat pump dryer. *Drying Technol.,* **27**(4) : 565- 573.

Miaruddin, M., Amiruzzaman, M., Choudhury, J.C.S. and Bhuiyan, M.I.M. (1995). Effect of containers on insect damage, viability and shelf-life of dried chilli during storage. *Bangladesh J. Agril. Res.*, **20**(1) : 39-45.

Pal, U.S., Khan, M.A. and Mohanty, S.N. (2008). Heat pump drying of green sweet pepper. *Drying Technol.,* **26**(12) : 1584-1590.

Papakumari, D., Ravishankar, C., Satyanarayana, C.H.V. and Rao, B.V. (2003). Effect of chemical treatment and drying methods on drying time, pod length and pod damage of chilli (cv. 2CA 235). *J. Food Sci. & Technol.,* **40**(2) : 233-235.

Pruthi, J.S. (1993). *Major spices of India: Crop management and post harvest Technology* (Ed.), Indian Council of Agricultural Research: NEW DELHI (INDIA).

Ranganna, S. (2000). *Handbook of analysis quality control for roots and vegetable products*. Tata McGraw Hill. Publishing. Ltd., NEW DELHI (INDIA).

Rocha, T., Lebert, A., Marty-Audouin, C. (1993). Effect of pre-treatment and drying conditions on drying rate and colour retention of basil. *Lebensm-Wiss Technol.,* **26** : 456-463.