International Journal of Farming and Allied Sciences
Available online at www.ijfas.com
©2015 IJFAS Journal-2015-4-7/606-609/ 30 September, 2015
ISSN 2322-4134 ©2015 IJFAS

Organoleptic evaluation of potato after using of pre drying, slices dimensions and Psyllium seed hydrocolloid-coating

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ABSTRACT: Potato (*Solanum tuberosum*) is one of the world's major agricultural crops and it is consumed daily by millions of people from diverse cultural backgrounds. The objective of this work was to determine organoleptic traits of potato after using of pre drying, slices dimensions and Psyllium seed hydrocolloid-coating. The effect of Psyllium seed hydrocolloid as coating material (0.5, 1%), changes in slices dimensions (6×1.25×1.25, 6×1.5×1.5) and predrying (reducing moisture to 60%) are assessed on the organoleptic traits. According to result, it was obtained that per-dry increased organoleptic characteristic in compare to control such as taste 31, color 18 percent and per-dry decreased appearance 34 percent. Also other treatment didn't have significant on taste and color but all treatment had significant effect on appearance.

***Keywords*:** Coating, Dimensions, Organoleptic, Pre drying, Psyllium seed hydrocolloid

INTRODUCTION

Potato (*Solanum tuberosum*) is one of the world's major agricultural crops and it is consumed daily by millions of people from diverse cultural backgrounds. Potatoes are always cooked before consumption traditionally by frying and other cooking methods (Pedreschi *et al*., 2006). Deep fat frying is extensively used in food processing both industrially and at home and fried potato products are one of its largest applications (Pedreschi *et al*., 2007). Coating potato slices with enameled materials by creating a uniform layer will prevent the transfer of moisture between the food and surroundings to maintain product fragility. Drying by microwave, treatment by hot air or cooking before frying will decrease oil uptake. Results showed that the predrying significantly reduced absorbed oil in final product and had a positive effect on the tissue properties [Agnieszka et al., 2008]. Joukar et al [2006] studied on the low fat potato chips which coated by hydrocolloid. They found that this type of coating will increases the quantity of moisture and decreases the oil uptake percent. 5% of Pectin, made the highest reduction in oil uptake and 1.5% of Carboxymethyl cellulose (CMC) had highest content of moisture. Hydrocolloid coating also decreases the peroxide value and acidic number during warehousing. Amiri et al [2010] studied on the effect of Psyllium seed hydrocolloid (0.1 and 0.2%) on properties of low fat yoghurt. Syneresis of low-hydrocolloid content samples was less than the blank samples. When reservation time increased, the Syneresis reduced. Results of sensory assessments confirmed that the addition of Psyllium seed hydrocolloid in 0.1% level, improved the yoghurt taste. Hosseinabadi et al [2011] found that blanching in Calcium chloride solution decreased the oil uptake in potato slices up to 62.8%. They also found that the CMC coating (1.5%) with Sorbitol (0.5%) reduced oil uptake from 19.85% to 16.29% in comparison with blank samples.

Fries color should be light, golden, without brown coloring penetrations or black spots or streaks. Color is determined by chemical composition of potato tubers (the amount of reducing sugars and/or starch), storing conditions, as well as by the parameters featuring the course of French fries production technological process

[Talburt, 1987]. Desired light golden color is obtained when frying in fat, as a result of Maillard reaction, and the time fries need for gaining their color becomes shorter as subsequent frying cycles take place [Agblor and Scanlon, 2000]. Taste and smell of fries are other important quality parameters; they should be specific of potato, fat in taste but without any flavor of bitterness, burning or rancid fat [Talburt, 1987]. The taste inside French fries should be similar to that of freshly boiled potatoes. The external crispy part of French fries should not bear any flavor of oil or burnt sugar [Tajner-Czopek et al., 2008]. Consumers also pay close attention to fat content, with high contents limiting consumer acceptance. In completely fried French fries, fat amount should not exceed 7–10%. The aim of this study was to investigate the effect of predrying slices dimensions and Psyllium seed hydrocolloid -coating on the organoleptic characteristics.

MATERIALS AND METHODS

Potato tubers (cv. Agria) were purchased from a local market in Khorram-darreh. Prior to investigations, their physical and chemical properties were examined and then they were stored at 5-7 ºC and 80% relative humidity. To decrease the reductant sugars, potatoes were kept in the room temperature for two weeks before experiments. The Psyllium seed hydrocolloid powder was prepared in laboratory from seeds and used for Plantago psyllium solution praparation. The oil for frying (mix of Olein and soybean oil) was purchased from Bahar Oil Company.

Psyllium seed hydrocolloid preparation

100g of Psyllium seed was powdered and using 30 mesh sieve, the crust was removed from the kernel, mixed with water (1:50) and kept in r.t. for 2 hr until it swollen. Then the mixture was centrifuged (10 min, 15000 rpm, Sigma K30K, Germany) and impurities were separated. The obtained gel was mixed with ethanol 96% and allowed hydrocolloid to precipitate and then it was centrifuged (5000 rpm). The last step repeated 3 times to remove all impurities. The product was dried with freeze dryer, powdered and kept in glass container at -20 ºC [Anonymous, 2005].

Psyllium solution preparation

To achieve 0.5% solution, 0.5 g of produced powder was homogenized in 100ml distilled water (70 ºC) until a clear solution was obtained and cooled to for 1% solution, 1g powder was used.

Potato slices preparation

The potato tubers were peeled and cut with a manual operated potato-cutting home device into 1.5×1.5×6 cm slices as control 1 (C1) samples and 1.25×1.25×6 cm slices as control 2 (C2). The slices were blanched in water at 90-95 ºC for 4 min and placed on a clean cloth to remove excess water [Anonymous, 2005]. They were immediately immersed in the prepared colloidal suspension for 1 min. To remove excess amount of colloidal solution, the slices were placed on a latticed tray. The weight of slices was recorded before and after coating. For predrying, slices were placed in oven at 80 ºC to reduce moisture content to 60% [Debnath et al., 2003].

Frying

The slices were fried at 175 ºC for 2.5 min in oil and then placed on a latticed tray to remove excess oil [Fred, 2005]. All fried samples were allowed to cool to r.t and analyzed.

Table 1. treatments

treatments	Coating percent	size	
$A_1K_1P_1$	1	6×1.5×1.5	Without pre-drying
$A_2K_1P_1$	0.5	6×1.5×1.5	Without pre-drying
$A_1K_1P_2$	1	6×1.5×1.5	pre-drying
$A_2K_1P_2$	0.5	6×1.5×1.5	pre-drying
$A_1K_2P_1$	1	6×1.25×1.25	Without pre-drying
$A_2K_2P_1$	0.5	6×1.25×1.25	Without pre-drying
$A_1K_2P_2$	1	6×1.25×1.25	pre-drying
$A_2K_2P_2$	0.5	6×1.25×1.25	pre-drying
C_1	-	6×1.5×1.5	
C_2	-	6×1.25×1.25	

Organoleptic characteristics

The five senses were using to evaluate the organoleptic characteristics, in this test, samples were coded and it evaluated by twenty sensory experts.

Analytical methods

Data Analysis

All experiments were conducted in a completely randomized design and repeated 3 times. Experimental data were analyzed by $SPSS_{20}$ (ANOVA). Differences between samples were considered at the 5% significant level.

RESULTS AND DISCUSSION

Sensory analyses of food color, taste, odor and texture are used in maintenance and control of food quality throughout the manufacturing process and in the final product [Maskan, 2001]. According to ANOVA, treatments didn't show significant effect on taste and among of treatments pre-drying effect was significant on the taste of potatoes ($P<0.01$). Also, Duncan test showed significant deference between pre-drying (3.8± 0.410 a) with control and using of pre-drying treatment increased taste value. Table 3 show Duncan result. The high temperatures and long drying times, required to remove the water from the sugar containing raw material in conventional drying, may cause serious damage to the flavor, color, nutritional value, reduction in bulk density and rehydration capacity of the dried product [Drouzas et al., 1999] but analysis of variation showed that treatments and them interaction didn't had significant effect on color but pry-drying treatment showed significant effect at 5% statistical level. Application of pre-drying treatment showed 3.8 values in compare to control 3.2. Result of appearance sensory evaluation showed that all treatment and interaction between treatments had significant effect at 1 or 5% statistical level. This trait decreased by using of pre-drying treatments in compare to control but it increased by using of Psyllium, table 2 and 3 show results. About slices dimensions, it obtained that greater slice dimension had higher mean (2.65 value). Also 6×1.25×1.25 showed 1.5 value. Drouzas and Schubert [1996] found that drying can result in poor quality products if not properly applied, and suggested that due to high cost of energy the method should be used only in cases where high quality of final product is demanded. According to result, it was obtained that per-dry increased organoleptic characteristic in compare to control such as taste 31, color 18 percent and per-dry decreased appearance 34 percent. Also other treatment didn't have significant on taste and color but all treatment had significant effect on appearance.

Table 2. Mean of squares for Organoleptic characteristics

	Df	taste	color	appearance
A	1	0.1	0.0002	0.225*
K	1	0.1	0.0001	13.22**
P	1	8.1**	3.6**	7.2**
A.K	1	0.1	0.0001	0.2*
A.P	1	0.1	0.0002	0.3*
K.P	1	0.1	0.0001	0.22*
A.K.P	1	0.1	0.0002	0.23*
Error	16	0.138	0.2	0.38

Table 3. effect of pry-dry on Organoleptic characteristics

	taste	Color	appearance
Control	2.9± 0.308 b	3.2± 0.4 b	2.5± 0.513 a
Pry-drying	3.8± 0.410 a	3.8± 0.4 a	1.65± 0.745 b

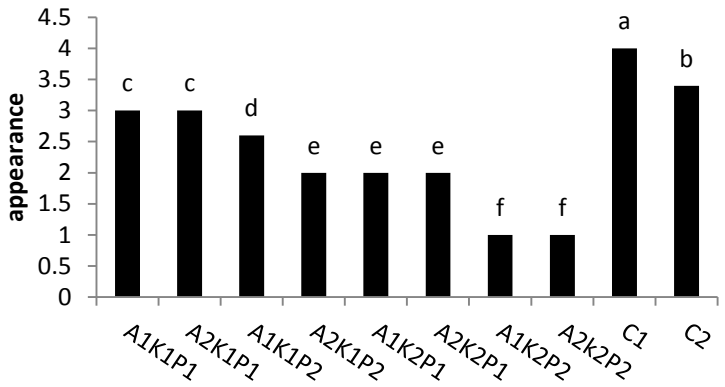

Figure 1. effect of treatments on appearance (Duncan 5%)

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