ORIGINAL PAPERS

UTILIZATION OF ONION LANDRACES IN THE REPUBLIC OF MACEDONIA FOR DEHYDRATION AND CHILLING

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INTRODUCTION

In global frames the demand for dry, minced and frozen onion consumption has incresing trend compared to the fresh one. The onion products processed in this way will have safer market and the uncertanty of onion growers will be reduced. Onion and garlic are widely used in dehydrated forms. Onion varieties for dehydration should have a high dry matter percentage(Fenwick, G.R. and Hanley, A. B.(1990). According to J o n e s and M a n n (1963) largest producers and consumers of dry onion are the USA. Considerable development of dehydration industry takes places in the countries that otherwise grow onion in large quantities, such as: Egypt, Mexico, Poland, Hungary and Bulgaria. In the last years this industry makes good results also in the Republic of Macedonia. There are several specialized companies for processing of fruits and vegetables. Altra company is well established for production of onion dice in two sizes 8x8 cm and 6x6 cm. The raw material is obtained from the sweet onion types, known as arshlama. Another company that have an interesting onion product is Agrova that produces sliced and minced dry onion. according to the technology used in this company out of one kilogram dehydrated onion, 800 g of minced onion can be produced. In the Republic of Macedonia there is a long year tradition in onion landraces cultivation. Different cultivation region in Macedonia have been distinguished by their characteristic long time ago. Commonly, the landraces are named after the cultivation region. The regions of Gostivar, Prilep, Struga and Skopje are considered as ones with highest production of onion. In these traditional production regions specific cultivation techniques are adopted and transferred from one generation to another generation of growers. Based on the cultivation techniques the landraces are divided into:
Pungent onions that are obtained from sets and Sweet onions (arshlami) that are obtained by seedlings.
Most frequently cultivated are Bucin and Gostivar sweet onion. Beside being cultivated for fresh consumption, these onions present a considerable quantity of raw material for the processing industry. Production of onion produce enables safe sales of the primary production. In the last years the number of processing plants have been increased. The most important processing are dry, minced and frozen onion.

MATERIAL AND METHODS

R. of Macedonia has a large number of onion local landraces. In order to evaluate the processing quality, four frequently used landraces in the processing industry has been analyzed. Two of them belong to the group of pungent onions – Melnik and Drachevo onion and two of the sweet onion – Gostivar and Buchin onion. Beside some morphological characteristics for the purpose of this survey the dehydration ratio has been analyzed, i.e. the quantity of fresh matter to obtain one kilogram of dehydrated produce. All analyses are carried out in laboratory conditions at temperature of 60-75^{0}C.
According to Brewster. J.L. (1994), the processing involves first washing the bulbs, removing the skin, root and tops, and the slicing and chopping. The slices are dried in hot air, starting at 75^{0}C and decreasing to 60^{0}C in three stages as the moisture content decreases. Drying at too high a temperature causes darkening (caramelization).
More important indicator about drying ability is the percentage of waste compared to the total of fresh onion mass and the clean onion fresh mass out of which certain products are being obtained with 6% of moisture.

RESULTS AND DISCUSSIONS

Pungent onions

Melnik landrace is grown from sets and cultivated in the region of Skopje. The shape of the bulb is typically flat. The colour of the cover scales is light to dark copper. This landrace is characterized by high dry mater content, up to 16,5% (table 1.). For production of one kg of dehydrated produce 8.5 kg of fresh onion is required. The left overs during processing is 7,9%. The landrace from the region of Drachevo is also reproduced by sets. The name is derived from the cultivation region. The bulbs are round to flat with light copper to slumber yellow

scales. Dry mater content is up to 15.96%. One kilogram of final produce is obtained from 8.8 kg of fresh onion, with loss of weight during processing up to 6,03% (table 1.). Based on the analyzed results we have come to a conclusion that there is correlation between the shape of the bulb and the bulb waste. As an example, the bulbs of Drachevo onion landrace which is characterized by round shape (index close to 1) have larger amount of useful mass, compared to the Melnic landrace.

Sweet summer onions The well known gostivarska arslama landrace is widely cultivated in the whole region of Gostivar. Sweet onions are cultivated by seedlings. The shape of the bulb is conical towards the neck and the bottom. Cover scales are with slumber yellow to light copper. In some cases, purple colored bulbs can be found. The percentage of dry mater is lower compared to the pungent onions, down to 9,6% (table2.). For one kg of final produce even 15.8 kg of fresh onions are needed. The sweet onions from the region of Buchin is also produced by seedlings. This landrace is widely cultivated in the whole region of Prilep. The bulb shape is round to flat and the outer scales are yellow to light copper colored. Dry mater content is also low, down to 9.2% (table 2.). Around 15 kg are required for production of one kg dried onion produce (table 3.).

Table 1. Features of onion sets varieties

Variety	Weight of bulb in gr.	Shape of bulb	Colour of cover scales	Shoot number	Number of uncovered scale	Dry matter in bulb %	Storage ability of bulb
Melnik	105	Flat	Light to dark copper	2.8	3.7	16.50	Excellent
Dracevski	124	Flat/Round	Light copper to slumber yellow	2.4	5.0	15.96	Excellent

Table 2. Features of summer arshalama varieties

Variety	Average weight of bulb in gr.	Shape of bulb	Colour of bulb	Shoot number	Number of uncovered scale	Dry matter in bulb %	Storage ability of bulb
Yellow arshalama (from Gostivar)	198	Flat/ round	Yellow	2.7	2.6	9.6	bad
Yellow arshalama (from Buchin)	201	Flat/ round	Yellow	1.9	3.4	9.2	bad

Table 3. Results for drying ability of the examined varieties

Variety	% Waste of the total fresh onion mass	Kg cleaned fresh onion mass needed for obtaining 1 kg of dry matter production	Total of fresh onion mass in kg
Melnik	7.90	8.50	9.22
Dracevski	6.03	8.80	9.36
Yellow arshalama (from Gostivar)	5.94	15.80	16.79
Yellow arshalama (from Buchin)	5.63	15.00	15.89

CONCLUSION

Analyzed results indicate that the landraces from the group of pungent onions are characterized by a very good dehydration ratio and are well recommended for the purposes of the processing industry, whereas sweet onions are more appropriate as a raw material for frozen produce due to the low dry matter content.

ABSTRACT

Market demand of specific onion products imposes certain changes in the primary production. In the Republic of Macedonia, only since recently some of processed type, such as dried, minced and frozen diced onion attracts buyer's attention. Development of onion processing industry makes the marketing and sales of the total production easer and provides safer economic environment for the onion growers. Local landraces that are mainly used for the processing industry belong to the groups of pungent onions and sweet onions. The pungent onions, being characterized with higher content of dry matter are used for dehydration and granulation or mincing. The shape of their bulb is flat to flat-round, well covered with yellow outer scales. Average dray mater content in the group of pungent landraces amounts more than 16%. One kg produce of dry onion is obtained by 8-9 kg of raw material.

Sweet onions in the Republic of Macedonia are mainly sold frozen, as a whole pilled bulb, or diced in different sizes. Compared to the pungent onions, this group of landraces is characterized by lower content of dry mater, ranging from 9% up to 10%. The analyses carried out have indicated that due to the higher amount of raw material (15 kg) required

for 1 kg of frozen produce, these landraces can not utilized for dehydration.

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Fig.1.Dehydrated and minced product in retail markets

Fig. 2. Preparation of frozen onion in factory - the Buchin village