

CONSUMER PREFERENCES FOR KIWANO FRUIT, A NEWLY INTRODUCED CROP IN ROMANIA

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Abstract

One of the main tasks of the breeding programs is introduction of new vegetables crops in order to provide vegetable diversity to the growing population. At Vegetable Research Development Station Buzau, Romania, Cucumis metuliferus has been acclimatized and today seedlings and seeds of 'Tempus' variety can be sold. Kiwano, it has multiple health benefits and plays an important role in supporting diverse and nutritious diets. But the fruit is not well known and is underutilised, due to the lack of promotion. Hence, the goal of this study was to investigate the consumer preference and also to popularize the fruit to a large scale of people. In our survey we have investigated a number of 57 respondents, aged between 18 and over 45 years. From our results, 51 people are opened to include the kiwano fruit in their diets. Also, a percentage of 85.9% from our respondents are interested in growing the jelly melon. It can be concluded that kiwano has a great commercial potential and, aimed at certain markets, could be an excellent source of cash for small farmers.

Key words: *Cucumis metuliferus, jelly melon, nutrition, questionnaire, survey.*

INTRODUCTION

In the present, the food industry is in search for healthy products since the worldwide health crisis redirected the consumer attitude, perception, and awareness to a diet rich in natural and high-quality products (Šeregelj et al., 2022; Amicarelli et al., 2021). In this context, one the main task in breeding programs is introduction of new vegetables crops in order to provide vegetable diversity to the growing population. At Vegetable Research Development Station Buzau, Romania, *Cucumis metuliferus* (kiwano, jelly-fruit, horned melon) has been acclimatized and today seedlings and seeds of 'Tempus' variety can be sold. Kiwano is a monoecious vegetable, that can be grown in open field or in greenhouses. From our research the best results were recorded in the greenhouse, because 'Tempus' is a late variety.

Horned melon is a climbing annual, with yellow-orange fruit and a juicy, jelly-like mesocarp. The plant origin goes back to Africa and nowadays is a speciality fruit in European markets. Several studies agree that the fruit is rich in various phytochemical components important in the daily diet. Due to the

remarkable ease of expansion of this fruit, horned melon could represent an economically advantageous nutritional source to alleviate malnutrition or provide phytochemicals to the food and pharmaceutical industries (Vieira et al., 2021; Ferrara, 2018)

In the literature, the relevant data on the nutritional value and phytochemical profile of horned melon fruit/pulp is available. Different studies have been proven the antioxidant potential of edible parts (Bölek, 2020; Mastusaka and Kawabata, 2010; Motlhanka, 2008) or that horned melon seeds are reducing blood cholesterol levels (Usman et al., 2015). Jimman et al. (2010) and Gotep (2010) demonstrated that the glycosides extracted from kiwano pulp have antihyperglycemic activity and also are preventing both heart attacks and strokes. Omale et al. (2011) and Wannang et al. (2008) confirmed the potential benefits of horned melon for the treatment of ulcer disease. Other studies also support the anti-inflammatory properties of the kiwano fruit (Vieira et al., 2021). It was also identified antifungal activity (Nwadiaro et al. 2015; Aliero and Gumi, 2012) and antiviral activity (Nimzing, 2009; Amagon et al., 2012) of horned melon.

Even so is not so common in Europe, and particularly in Romania, kiwano fruit is a popular snack in different parts of the world, like Africa, Australia, New Zealand and parts of US.

Over the past two decades, consumer demand for niche products (including exotic and unusual fruits) has grown substantially. People are interested in buying new, various type of fruits and vegetables in order to switch their menu. Even so this is a worldwide trend, in Romania people are still reluctant about changing their diet. In our study, we have investigated the consumer preference about the newly introduced fruit and its benefits. Understanding consumers and popularize the fruits is a key to improving our activity.

MATERIALS AND METHODS

The fruits of *Cucumis metuliferus* 'Tempus' variety were grown in the research greenhouse of Vegetable Research Development Station Buzau, Romania. The seeds were sown in the first decade of March in plastic pots with 70 cubes with a volume of 50 mL/cube in a mixture of peat and sand. The seedlings were planted 45 days after sprouting (3-4 leaf stage) in a sandy-loam soil, very well drain and the planting scheme used was 120 x 60 cm. Kiwano is an annual climbing vegetable and needs support in order to fully develop. Throughout the vegetation period, no serious pathogens were reported in order to damage the crop. The fruits were harvested at physiological maturity and were analysed by our colleagues from Department of Chemistry, Physics and Environment, "Dunarea de Jos" University of Galati. The biochemical results (Busuioc et al., 2020) have shown that kiwano fruit has a high content in vitamin C (6.22 mg/10 g fruit), a good concentration of polyphenols and a beneficial antioxidant capacity.

Our survey included 17 questions, in the first part was described the demographic profile of the respondents, followed by the main characteristics of the fruit and in the last section we discussed about medicinal proprieties, price and consumer preferences. Information used in this study was obtained from a survey of 57 respondents from Buzau County, Romania, aged over 18 conducted at Vegetable Research

Development Station Buzau, Romania. The resulted data were analysed with descriptive statistic methods.

RESULTS AND DISCUSSIONS

Cucumis metuliferus (Figure 1) is an accessible and easy crop to grow in the greenhouse or polytunnel. It has a long vegetation period and is a late-variety, with fruits reaching maturity at the beginning of September. Unharmed fruits can be kept for almost a year at room temperature. The crop has no serious pest, and can be grown successfully in organic systems. The yield potential of the crop is very high, and the crop maintenance cost are low due to genetic resistance of the species.



Figure 1. Mature and immature fruit of kiwano

The fruits were harvested at technological maturity and were share within our respondents. In Figure 2 is shown the fruit section of 'Tempus' variety.



Figure 2. Fruit section of 'Tempus' variety

The information in this study was obtained from a survey of Romanian consumers, aged over 18 and the demographic profile of the respondents are shown in Table 1.

Table 1. Demographic profile of respondents

Variable	Consumers	
	No.	%
Sex		
- Men	30	52.6
- Women	27	47.4
Area		
- Urban	29	50.8
- Rural	28	49.2
Age		
- 18-24	21	36.8
- 25-35	9	15.8
- 35-45	6	10.6
- Over 45	21	36.8
Studies		
- Elementary school	15	26.3
- High school	20	35.1
- College	22	38.6

Most of our respondents are young people with age under 24 (36.8%) or over 45 (36.8%). Mainly are people with college (38.6%) and high school (35.1%) studies.

In the second part of the survey, it was discussed about the main component of fruit: flavour - defined as being made up of taste (sour, sweet-sour, aromatic, neutral), aroma – texture (juicy, jelly-like, fleshy), fruit smell (citrusy, kiwi-like, cucumber-like, other) and shape (if consumers are tempted to buy it).

Despite the odd-looking fruit, horned melon was tempted to buy for a percentage of 31.6% respondents, while for 54.4% respondents were in between. At the opposite pole, 5.3% of people were not interested in buying the fruit and 8.8% were barely inclined to purchase the fruit.

In regard for the main attributes of fruit (Table 2), 45.7% consumers think that kiwano has a kiwi-like smell, while others (33.3%) assimilate the smell to fresh cucumbers or unripe bananas (12.2%) or else with a citrusy smell (8.8%). The fruit taste was sweet-sour for 56.1% consumers, while others found it sour (19.3%). The fruit texture varied from fleshy (12.3%) to juicy (40.3%) and to jelly-like for 47.4% of consumers. The fruit taste reminds of kiwi fruit

to 61.4% of respondents while others (26.3%) assimilate with fresh cucumber.

Table 2. Fruit attributes

Variable	Consumers	
	No.	%
Fruit smell		
- Citrusy	5	8.8
- Fresh cucumber	19	33.3
- Kiwi	26	45.7
- Other (unripe bananas)	7	12.2
Fruit taste		
- Aromatic	7	12.3
- Neutral	7	12.3
- Sour	11	19.3
- Sweet-sour	32	56.1
Fruit texture		
- Fleshy	7	12.3
- Jelly-like	27	47.4
- Juicy	23	40.3
What does the fruit taste remind you of?		
- Banana	5	8.8
- Cucumber	15	26.3
- Kiwi	35	61.4
- Other (banana-kiwi)	2	3.5

In the next part of our survey, we discussed about the potential utilization of horned melon fruit for health promotion, diseases prevention, and also about many health benefits to consumers' daily diet. After a short presentation of the kiwano fruit benefits we had had questions about how easy is to consume horned melon fruit, if they are willing to introduce the new fruit to their diet and if they will recommend it to other people (Table 3). In general, consumers we're opened to introduce kiwano fruit in their diet and 91.2% respondents will recommend it to other people. Horned melon is an easy and cash worthy crop and 85.9% respondents would like to grow it. In the last part of our survey, it was an open-ended question about how much money will spend on one fruit. The mean results of the respondents were about 1.5 euros/fruit. Nowadays, in the sales market, the fruit can be bought for 1 euro.

The last question of our survey is a Likert scale (1-strongly disagree and 10-strongly agree) and refers to consumer preference for kiwano fruit. The majority of respondents noted with 8 the kiwano fruit (a pleasantly fruit).

Table 3. Potential utilization of kiwano fruit

Variable	Consumers	
	No.	%
Do you find the fruit easy to consume?		
- No	11	19.3
- Yes	46	80.7
Kiwano has a long shelf life, for almost a year, will you consume it daily?		
- No	14	24.6
- Yes	43	75.4
If you knew that kiwano has a lot of vitamins, minerals and zero calories will you consume it daily?		
- No	12	21.1
- Yes	45	78.9
Will you recommend the fruit to other people?		
- No	5	8.8
- Yes	52	91.2
Kiwano has zero calories and a high protein content, will you use it in your diets?		
- No	6	10.5
- Yes	51	89.5
Horned melon is an easy crop to grow. Would you cultivate it?		
- No	8	14.1
- Yes	49	85.9

CONCLUSIONS

From our research it can be concluded that kiwano has a great commercial potential and, aimed at certain markets, could be an excellent source of cash for small farmers.

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