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Effect of Press Construction on Yield and Quality of Apple Juice

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Abstract: The paper presents the possibility of applying different press constructions for juice extraction in small farms. The research was carried out with three different varieties of apples, namely, Rubin, Mutsu, and Jonaprince. Two types of presses were tested: a basket press and a screw press. Generally, application of the screw press makes it possible to obtain a higher yield of extraction compared to the basket press. In our study, the differences in the pressing yield among press machines also depended on the apple variety used. The juices obtained on the screw press were found to be of a higher quality characterized by a higher content of soluble solids, higher viscosity, higher total content of polyphenols, higher antioxidant activity, and lower acidity. Thus, the selection of an appropriate press is the key to producing high-quality apple juice with health-promoting properties for manufacturers of apple juice at the local marketplace.

Keywords: sustainable production; screw press; basket press; polyphenols; antioxidant activity; texture properties

1. Introduction

Apples (*Malus domestica*) are the most commonly used fruit for juice extraction in the European Union (EU). They are a rich source of nutrients and polyphenols and possess antioxidant properties that have beneficial effects on human health [1,2]. The yield of apples is estimated to be 12.59 million tons per year in Europe and 3.6 million tons in Poland [3].

Apples are mainly processed into concentrates, which contributes to the reduction of volume and facilitates storage. Poland is the largest producer and exporter of concentrated juices extracted from fruits grown in the temperate zone of the EU [4]. The European share of the juice yield was estimated to account for 66% in 2016.

Currently, there is a growing trend towards healthy eating and an increased interest in ecological produced food. This in turn contributes to the increasing interest of scientists in functional foods and new methods of production to preserve their quality and high level of bioactive compounds [5]. Some examples of these kinds of foods include juices that are not obtained from concentrate (NFC) and freshly squeezed non-pasteurized juices (FS). These juices are obtained from the fruit tissue by pressing and centrifugation of the pulp. Cloudy juices are classified as products obtained with a low degree of processing. They contain higher amounts of bioactive compounds, such as polyphenols or flavonoids, than clarified ones due to the omission of enzymatic and clarifying treatments. They are also richer in dietary fibre, which is necessary for the proper functioning of the digestive system, and several mineral compounds [6]. In their studies, Paepe et al. [7] and Markowski et al. [8] showed that cloudy juices contain substantially higher amounts of beneficial compounds such as polyphenols and also exhibit considerably higher antioxidant activity than clarified juices. Additionally, apple pomace obtained after low-degree processing can be used as animal feed after drying or pickling. The natural nutrients contained in the pomace can serve as a valuable source of nutrition for animals in organic farms [9].

Fruit juices are extracted on an industrial scale using different devices, depending on the type of operation (periodic or continuous) and raw material [10]. Many different press construction solutions are used in the industry for obtaining apple juice. Among them, belt press, water press [11], decanter, rack-and-frame press, hydraulic press [12], basket press [13], and screw press [14] are the most distinguished.

A basket press ensures high pressing yields of up to 60%, but it is less often used on an industrial scale. In one study, Nadulski [15] confirmed the usefulness of the basket press in juice extraction from Jonagold apples. In another study, the same author and his group [10] showed that not all apple cultivars are suitable for juice pressing under farm conditions. This suggests that the use of a suitable fruit variety for juice pressing may reduce the cost of pressing and increase the quality parameters of the juice produced.

A screw press is mainly used for oil extraction from oilseeds such as rape [16,17], flax [18], sunflower [19], cumin [20], tobacco seeds [21], and pistachio nuts [22]. Currently, screw presses are becoming increasingly popular, especially on small farms, among local entrepreneurs and for domestic applications. Based on the construction solution, screw presses are classified as single- and double-screw type. These presses are characterized by several extracting processes, where the pulp is subjected to energetic grinding and mixing. The main advantage of a screw press is that the juice obtained has a much higher amount of soluble solids and bioactive compounds [23,24].

The programmes implemented by the EU such as 'Agricultural and rural development 2014–2020' and 'Promotion of farm products' help producers develop new products based on the policy of sustainable agriculture [25,26]. These programmes allow appropriate usage of resources (raw material, energy) and increase the effectiveness of production without affecting the environment [27]. The protection and promotion of regional and traditional products is one of the most important factors supporting the sustainable development of rural areas (as it increases the income of agricultural producers, prevents depopulation and enhances the attractiveness of rural areas). In addition, this may be considered as potentially influencing the development of agricultural products. In the context of sustainable agriculture, the use of a new press construction may allow the farmers to obtain juices with higher quality and a large amount of bioactive compounds. Moreover, fresh pressing of apple juice may help open new markets.

Considering the above, it appears viable that local farms can use small presses for juice production. In this view, the aim of the present study is to compare the efficiency of screw and basket presses in the extraction of apple juice. This includes the determination of parameters affecting the juice quality such as the content of soluble solids, pH, viscosity, total phenolic content (TPC) and antioxidant activity.

2. Materials and Methods

The research material included three varieties of apples, namely Rubin, Mutsu, and Jonaprince, all obtained from the 2017 harvest. The fruits were delivered by Groups of Fruit Producers, which is related to the company Rylex Sp. z o.o with office registered in the village of Błędów (near Grójec, Poland; GPS coordinates: 51°47′N, 20°42′E), to the local Auchan store in Lublin, Poland.

The experimental flowchart is presented in Figure 1.

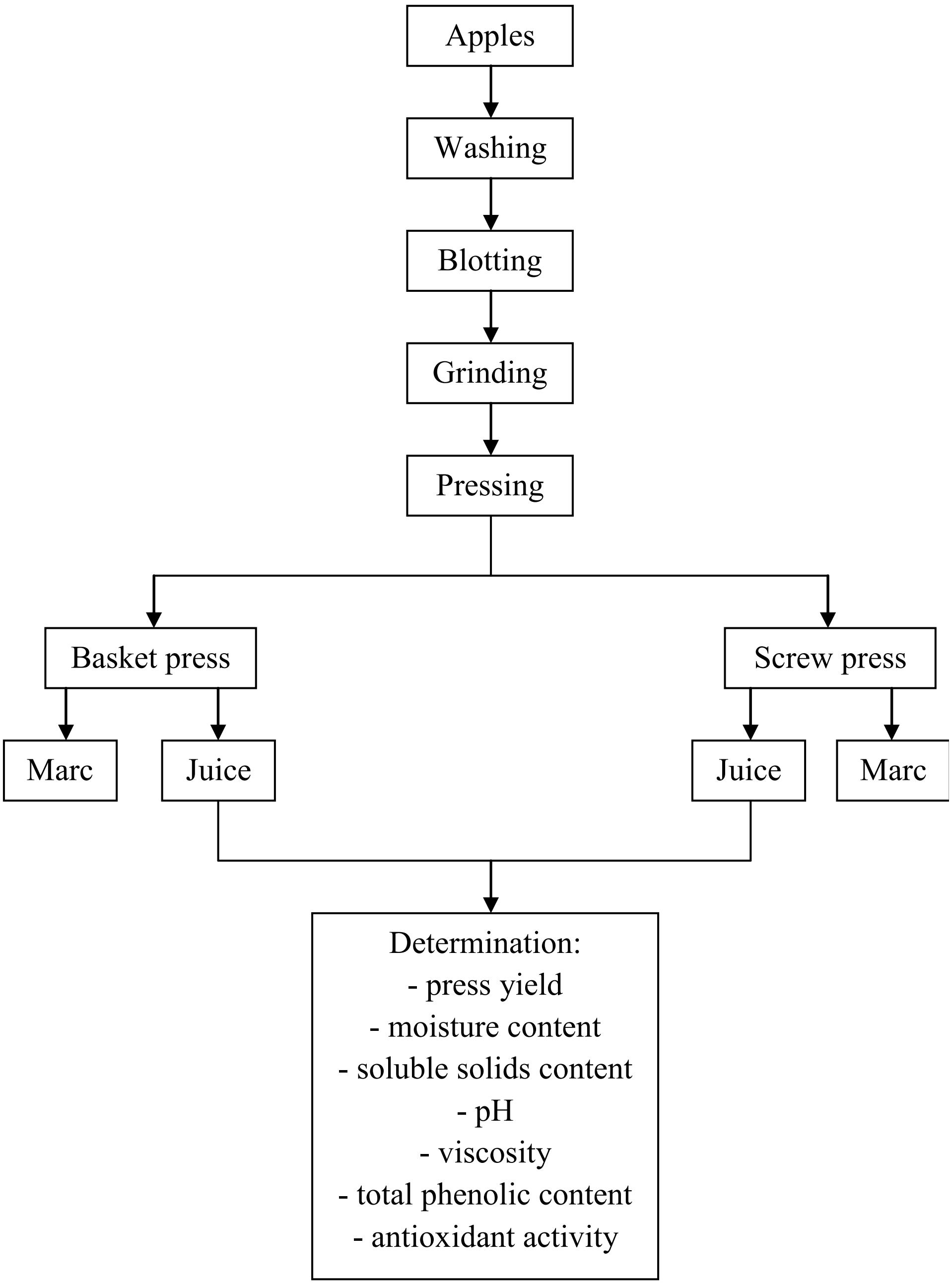

Figure 1. Experimental flowchart.

2.1. *Washing and Blotting*

The apples were washed in tap water and blotted dry using laboratory tissue paper.

2.2. *Grinding*

The apples were crushed using a shredding machine (MKJ250; Spomasz Nakło, Poland) equipped with a standard grating disc with 8 mm holes. The rotational speed of the disc was set at 170 rpm. The obtained mash was divided into portions weighing 300 g and placed in plastic containers.

2.3. *Determination of Moisture Content*

The moisture content of the apple mash was measured before pressing by drying 3 g of mash at a temperature of 105 °C for 3 hours [28]. The measurements were carried out in five replicates.

2.4. Analysis of Texture Properties

The texture of the apples was examined using a texture analyser (model TA.XT Plus Texture Analyzer) equipped with a measuring head that has a working range of up to 0.5 kN. A double-compression test and a cutting test were performed. The speed of the measuring head was set at 0.83 mm·s^{-1} for the double-compression test (TPA) and 1 mm·s^{-1} for the cutting test. For TPA, the apple samples with skin were cut into cylinders of 15 mm diameter and 10 mm height and were then placed with their diameter dimension parallel to the device base. Hardness was defined as the maximum force recorded during the first compression cycle (Fh). For the cutting test, a Warner–Bratzler blade was used. The samples with skin were cut into cylinders of 20 mm diameter and 20 mm height. The maximum value of the cutting force (Fc) was determined. The texture analysis was repeated ten times.

2.5. Pressing

Two kinds of presses were used to extract apple juices: basket press and screw press.

2.5.1. Types of Presses

The basket press (Figure 2) consisted of a perforated cylinder with holes of 3 mm diameter, piston, construction frame, and hydraulic system (UHJG 20/C/2; Hydrotech, Lublin, Poland), which allowed for maintaining a pressure of 4.5 MPa. The press was equipped with a tensometric sensor system for measuring pressure (EMS50; WObit, Poznan, Poland) combined with a digital recorder (MG-TAE1; WObit, Poznan, Poland).

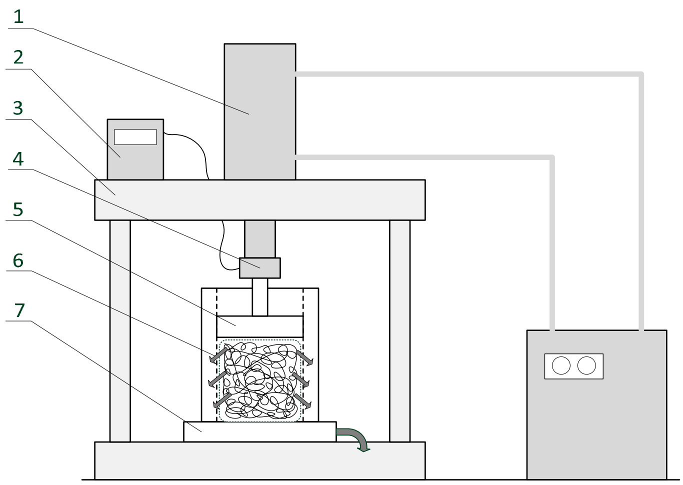

Figure 2. Construction and principle underlying the operation of the hydraulic press: 1 – hydraulic ram, 2 – measurement system, 3 – frame, 4 – tensometer, 5 – piston, 6 – cylinder and 7 – base.

The screw press used was a twin-screw type (Green Star Elite 5000; Tribest), which had a rated power of 260 W and was equipped with a sieve with holes of 0.4/0.5 mm. The press has two rotating gears. The dual stainless steel gears contain magnets and utilize bioceramic technologies that pull more nutrients into the juice. The press gears at a low 110 rpm and generates minimal heat while juicing.

2.5.2. Extraction Procedure

The sample materials weighed 300 g. They were pressed in ten replicates in each type of press.

In the case of the basket press, the material was put in a special bag made of pressing cloth, placed in the cylinder of the press, and subjected to the force applied by the piston. Once a pressure of 4.0 ± 0.1 MPa was reached, the extraction process was stopped.

In the case of the screw press, the material was directly put into the press chamber.

The extracted juice was collected in plastic containers, filtered using a Whatman No. 1 filter and stored in a refrigerator at a temperature of 4 °C.

2.5.3. Pressing Yield

The efficiency of pressing was calculated using the formula:

$$W_j(\%) = \frac{M_j}{M_i} \cdot 100 \quad (1)$$

where

W_j is the efficiency of pressing (%),
M_j is the mass of juice after pressing (kg), and
M_i is the mass of input material (kg).
The calculation was performed for all ten replicated samples.

2.6. Determination of Soluble Solids Content (Brix) and pH

After each extraction, the weight of the obtained juices was measured. The pH [29] and content of soluble solids [30] were also calculated. To determine the pH of the juices, a CP-411 pH-meter (Elmetron, Zabrze, Poland) was used. The content of soluble substances in fruit juices was measured using a PAL-3 refractometer (Atago, Tokyo, Japan). The parameters were determined in three replicates for each sample of extracted juice.

2.7. Determination of Viscosity

Viscosity was measured using a Brookfield viscometer (model LVDV-II + PRO; Brookfield Engineering Laboratories) with Rheolac 3.1 software. A 16 mL sample of juice was taken in ULA – 10EY-baker for all experiments. The spindle speed was set at 10–80 rpm, which corresponded to a shear rate of 12.24–97.84$\cdot s^{-1}$. The temperature was kept constant at 20 °C using a water bath (Brookfield TC-502P). The measurement was performed in three replicates for each sample.

2.8. Determination of TPC

The total phenolic content (TPC) of apple juices was determined according to the FC method [31] with slight modification. Gallic acid was used as the standard and was diluted with methanol (1 mg/1 mL) to give the appropriate concentrations required for plotting a standard curve. First, the sample extract (0.2 mL) was mixed with 2 mL of methanol in a 25 mL volumetric flask. Then, Folin–Ciocalteu reagent (2 mL, diluted 1:10) was added and allowed to react for 3 minutes. Next, 2 mL of Na_2CO_3 solution were added, and the mixture was made up to 25 mL with distilled water. After leaving the mixture for 30 minutes at room temperature in the dark, the absorbance at 760 nm was measured using a spectrophotometer (UV-1800; Shimadzu, Japan). The results were expressed as mg gallic acid equivalent per 100 mL of fresh juice (mg GAE 100 mL^{-1}). The measurement was performed in three replicates for each sample.

2.9. Determination of Antioxidant Activity

The antioxidant activity of apple juices was evaluated using DPPH (2,2-diphenyl-1-picrylhydrazyl) assay. For this analysis, 0.2 mL of apple juice was mixed with an aliquot of 5.8 mL of freshly prepared $6 \cdot 10^{-5}$ M DPPH radical in methanol. After allowing to stand for 30 minutes at room temperature, the spectrophotometric absorbance of the juice at 516 nm was measured using methanol as a blank. The measurement was performed in three replicates for each sample. Antioxidant activity was expressed as percentage inhibition of the DPPH radical calculated using the following equation [32]:

$$AA(\%) = \frac{\text{Absorbanceofcontrol} - \text{Absorbanceofsample}}{\text{Absorbanceofcontrol}} \cdot 100 \quad (2)$$

2.10. Statistical Analysis

Statistical analysis of the data was performed with Statistica software (Statistica 12; StatSoft Inc., Tulsa, OK, USA) using analysis of variance for factorial designs. The significance of differences was tested using Tukey's least significant difference (LSD) test ($p \leq 0.05$) and using T-test ($p \leq 0.05$) for data in Tables 1 and 2.

Table 1. Total soluble solids (Brix) of the apple juice depending on the type of press machine.

Variety	Solid Soluble Content (in Brix)	
	Basket Press	Screw Press
Rubin	11.9 ± 0.00a	13.1 ± 0.00b
Mutsu	12.9 ± 0.00a	12.9 ± 0.00a
Jonaprince	11.2 ± 0.00a	11.9 ± 0.00b

a, b and c – average values in the row marked with the same letter are not statistically significantly different (T-test, $p \leq 0.05$).

Table 2. Acidity (pH) of the apple juice depending on the type of press machine.

Variety	Acidity (pH)	
	Basket Press	Screw Press
Rubin	3.61 ± 0.012a	3.45 ± 0.125b
Mutsu	3.72 ± 0.008a	3.62 ± 0.08b
Jonaprince	3.81 ± 0.008a	3.73 ± 0.012a

a, b and c – average values in the row marked with the same letter are not statistically significantly different (T-test, $p \leq 0.05$).

3. Results and Discussion

3.1. Moisture Content of Fresh Apples

The moisture content of the apples ranged from 84.0% to 85.27%, and no significant differences were observed between the tested varieties. Moisture content is an important parameter to be determined to carry out further investigations because it influences the yield of juice processing.

3.2. Effect of the Press Construction on the Yield of Pressing

The effect of the type of press on pressing yield is shown in Figure 3.

The yield of pressing ranged from 61.9% to 71.6%. Generally, higher pressing yields were obtained with screw press. In addition, statistical analysis showed significant differences in the efficiency of juice extraction from the pulp of the different varieties of apples. A statistically significant effect of the press type on the pressing yield was observed in the case of the Mutsu and Jonaprince varieties, whereas no significant differences were noted in the case of Rubin.

In the case of the screw press, pieces of apple are fed into the cylinder and thrown to the perforated wall by the centrifugal action of the gears. These gears crush, cut, and squeeze the pieces at the same time. This maximizes the yield as well as the quality of juice. The yield of the recovered juice depends on the diameter of the perforations, the speed of rotation of the gears and the gap between the knob and the pulp discharge casing.

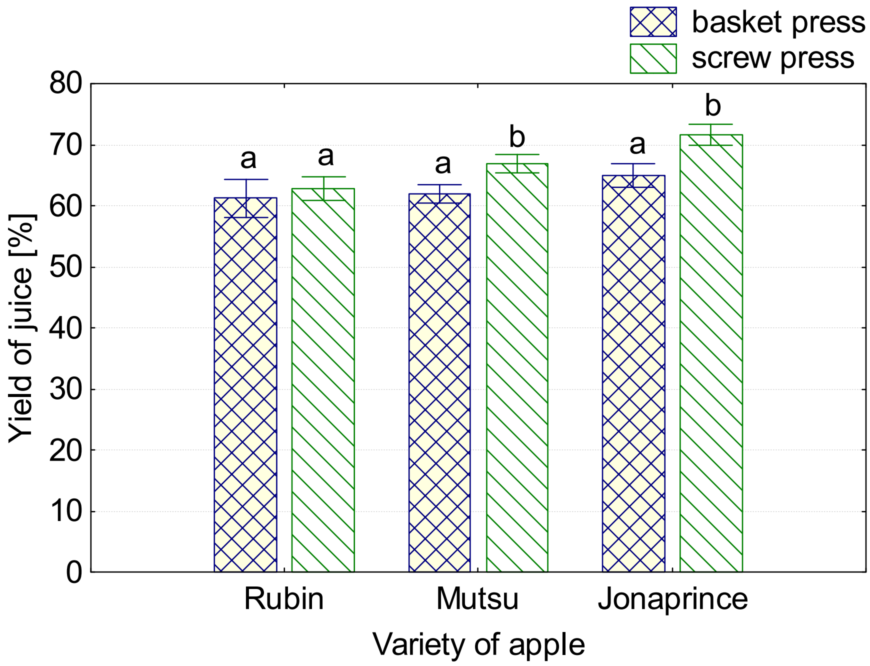

Figure 3. Effect of the type of press machine on the pressing yield.

In the case of the basket press, the crushed material is wrapped in the pressing cloth and gradually compressed by the hydraulic piston. The pressing cloth serves both as a package for the mash and as a filter for the juice.

In the case of the screw press, the correct course of the process is influenced by the texture of apples. Apples with a greater hardness are better for juice extraction on screw press, whereas those with a lower hardness are shredded to very small-sized particles, creating a layer of mousse inside the chamber, which clogs the sieve openings. This leads to a drop in the pressing yield or the passage of the mousse to the liquid phase.

To support the hypothesis about the relationship between hardness and yield of pressing, the texture properties of the apples were analysed.

Figures 4 and 5 show the hardness and cutting force of the tested apple varieties, respectively.

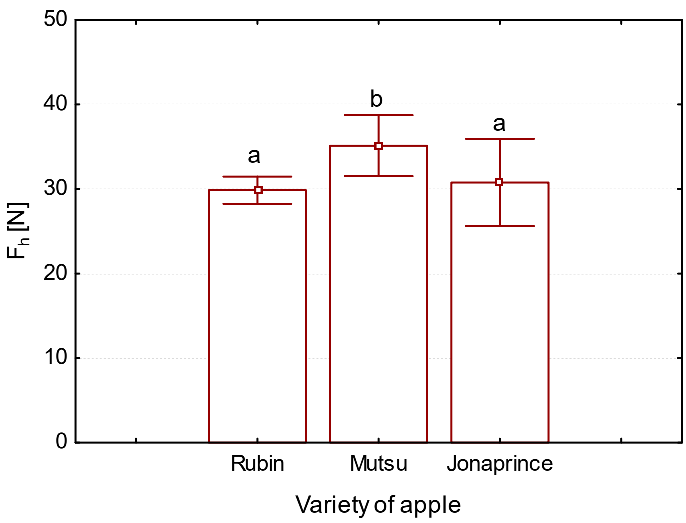

Figure 4. Hardness of the tested apple varieties.

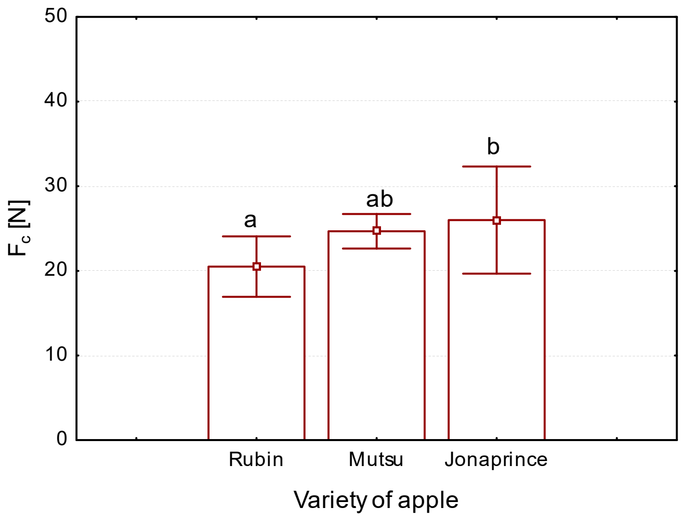

Figure 5. Cutting force of the tested apple varieties.

The texture analysis showed that, among the studied varieties, Rubin had the lowest hardness and cutting force. Probably due to these features, no statistically significant differences in the pressing yield were observed between the basket press and the screw press for this cultivar.

High efficiency of pressing was also reported by Takenaka et al. [33] when screw press was used for the extraction of citrus juice. In their experiment, the authors demonstrated that, of the three tested presses (belt, centrifugal and screw press), screw press provided the highest yield of pressing. The extraction yield obtained with the screw press was approximately 54% higher as compared to the belt press and approximately 18% higher as compared to the centrifugal extractor.

3.3. Effect of the Press Construction on the Soluble Solids Content

The content of soluble solids mainly reflects the amount of sugars and organic acids and is a very important parameter of juice quality. A study conducted by Eisele and Drake [34] showed that the content of soluble solids in juices obtained from various apple cultivars varied from 10.26 to 21.62 Brix.

In the present study, the content of soluble solids in the juices ranged from 11.2 to 13.1 °Brix (Table 1). This is similar to the content of soluble solids in the pressure-extracted apple juice produced in the Polish fruit and vegetable industry (i.e., 11.0–12.4 Brix) [35].

Generally, the juices obtained on the screw press had statistically significantly higher content of soluble solids than the ones obtained on the basket press. This was due to the wider opening of cell membranes and release of greater amounts of the deep-seated nutrients.

It was noted that the press type had no statistically significant effect on the content of soluble solids in the case of the Mutsu variety, probably due to the structure of the apple tissue. In fact, the flesh of the Mutsu apples is characterized by a coarse structure, while the Rubin and Jonaprince apples have a fine-grained structure. It was likely that the basket press enabled the breakdown of coarse-grained apples to the same extent as the screw press. Therefore, no effect of the type of press on the extract content was found in the case of the Mutsu variety. On the other hand, due to the wider opening of the cell membranes, the screw press enables a better breakdown of fine-grained structure. Therefore, there were differences in the content of soluble solids between presses in the case of the Rubin and Jonaprince varieties.

3.4. Effect of the Press Construction on Acidity

The apple juices were characterized by different levels of acidity (Table 2).

The pH of the juices obtained in this study ranged from 3.45 to 3.81. According to the literature, acidity (pH) of the apple juice varies from 3.37 to 4.24 [34]. Kobus et al. [14] found that the pH of the apple juice obtained on the screw press was in the range of 3.66 ± 0.09.

The press construction had a significant effect on the pH of the tested apple juice. It was observed that the juice extracted on the screw press had a slightly higher acidity (lower pH) compared to the juice from the basket press. The acidity was higher by 2.2%, 2.8%, and 4.6% for Jonaprince, Mutsu, and Rubin, respectively. A probable reason for the higher acidity of the juices from the screw press was increased migration of microelements, organic acids, and secondary plant metabolites such as polyphenols caused by the greater disintegration of membranes and cell walls.

Acidity is one of the most important traits of freshly squeezed apple juice. It influences the flavour, clarity, colour, aroma, and overall sensory satisfaction [36]. In addition, high acidity acts as a natural barrier against contamination by most microorganisms [37]. Consequently, it is reasonable to employ the screw press to produce juice with relatively high acidity.

3.5. Effect of the Press Construction on Viscosity

The viscosity of the juices obtained in this study ranged from 3.15 to 4.35 mPa·s (Figure 6). The viscosity of cloudy apple juice showed a wide range from 1.7 to 9.6 mPa·s, depending on the apple variety, method of processing, and concentration of soluble solids. Genovese and Lozano [38] found that the viscosity of apple juice from Granny Smith cv. ranged between 1.71 mPa·s at 10 °Brix and 3.65 mPa·s at 20 °Brix. Will et al. [39] reported that the values of viscosity ranged between 1.74 (Topaz cv.) and 2.15 mPa·s (Boskoop cv.), and the values determined by Teleszko et al. [40] ranged between 2.40 and 9.60 mPa·s.

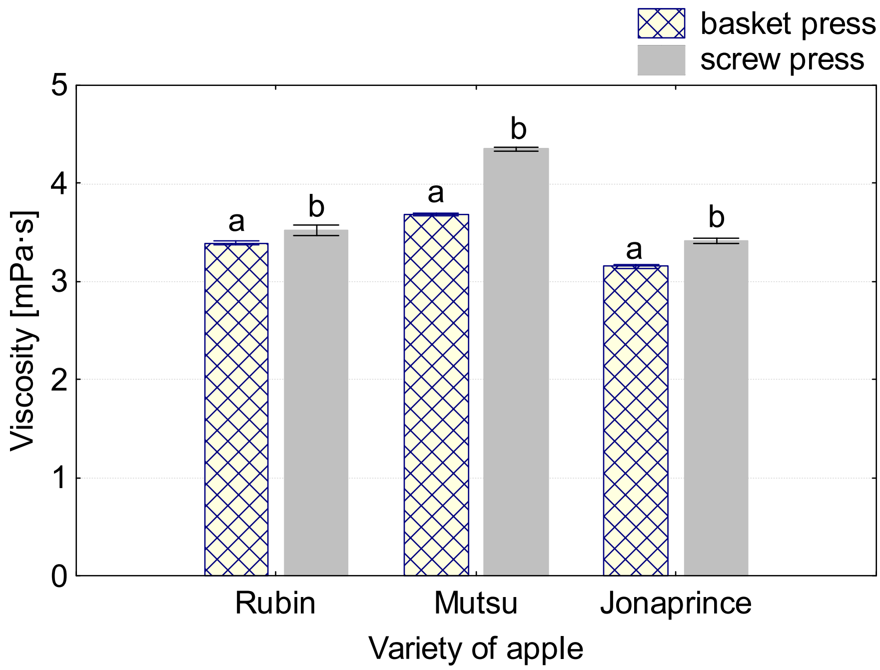

Figure 6. Viscosity of the apple juice depending on the type of press machine.

In the present study, the press construction was found to have a significant effect on the viscosity of the apple juice. In the case of Rubin, the viscosity of apple juice obtained on the screw press was 3.8% higher compared to the juice from the basket press. In the case of the Jonagold, the difference was greater and amounted to 8.3%, while the highest difference amounting to 18.2% was observed in the case of Mutsu.

The rheological behaviour of a cloudy juice is governed by both liquid viscosity and size characteristics of the solids [41].

In the case of clear juice, the viscosity depends on the content of soluble solids, with sugars playing the main role [42]. The juice from the Jonaprince variety obtained on the basket press was characterized by the lowest content of soluble solids and lowest viscosity. By contrast, the juice obtained on the screw press had a higher content of soluble solids, which probably resulted in higher juice viscosity. Thus, in the case of Jonaprince, the higher viscosity of the juice obtained from the screw press could have resulted from the greater disintegration and release of soluble phytochemical ingredients from apples.

There were no statistically significant differences found in the content of soluble solids in the juices obtained from the Mutsu cultivar between the tested presses. The higher viscosity observed in the case of this variety may be caused by the higher amount of total suspended solids in the juice obtained on the screw press, and due to the use of the pressing cloth, which serves both as a package for the mash and as a filter for the juice, for extraction on the basket press.

In the case of Rubin, the higher viscosity of the juice obtained on the screw press was mainly due to the higher content of soluble solids.

3.6. Effect of the Press Construction on TPC

Polyphenols play an important role in fruit juices because they influence the colour and flavour [11]. The content of polyphenols in juices varies depending on both the fruit variety and production technique used.

In the present study, the content of polyphenols in the juices ranged from 29.89 to 60.96 mg GAE 100 mL^{-1} (Figure 7).

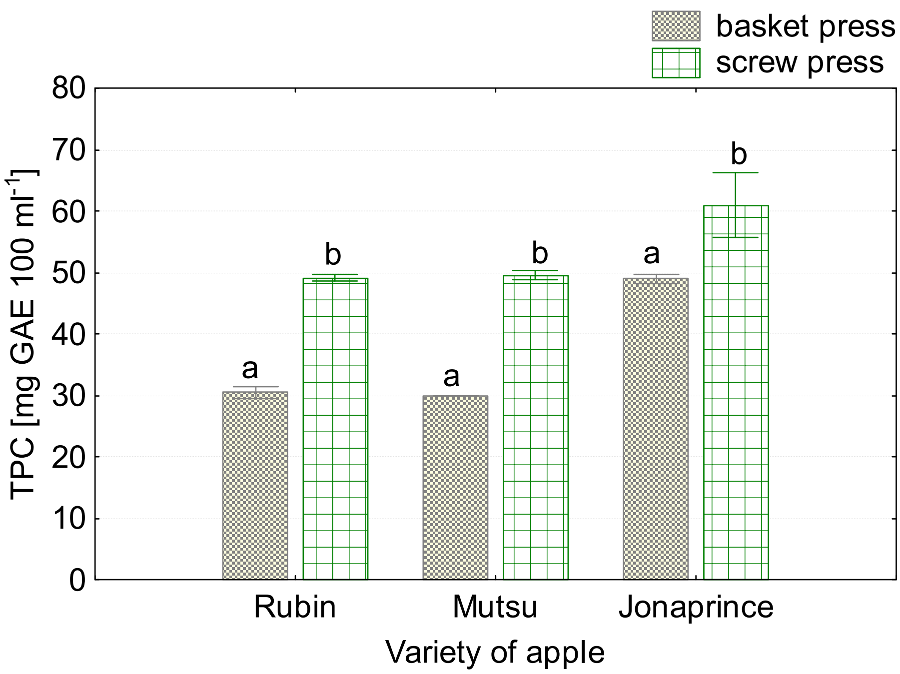

Figure 7. Total phenolic content of the apple juice depending on the type of press machine.

The TPC in juices produced in Europe varies within a broad range from 10 to 300 mg GAE 100 mL^{-1} [43]. Kobus et al. [14] showed that the content of polyphenols in juices obtained on the screw press ranged from 44.2 to 58.3 mg GAE 100 mL^{-1}.

In this study, the statistical analysis revealed a significant effect of the press type on the content of polyphenols in the obtained juices. The juices from the screw press were statistically significantly richer in polyphenols than the juices from the basket press. The higher content of polyphenols in the juice from the screw press was related to the higher percentage of solid particles and probably better grinding of apple tissue, especially skin.

It is generally known that apple skin is characterized by a higher content of polyphenols compared to the flesh. There is up to a three- to fourfold difference between these two tissue types [44]. Thus, with the complex action of the gears, the screw press ensures better disintegration of apple skin and greater release of the cell contents to the extracted juice.

It is also known that the content of phenolic compounds decreases gradually during grinding and pressing due to the oxidation of pulp and freshly extracted juices [11,45]. So, our results can also be attributed to the rate of mash oxidation. Since the apples were disintegrated directly in the screw press, the entire process of juice extraction was faster and the rate of mash oxidation was lower than in the case of the basket press.

Noteworthy, for varieties with similar contents of polyphenols in the juice extracted on the basket press (Rubin – 30.47 mg GAE 100 mL^{-1} and Mutsu – 29.89 mg GAE 100 mL^{-1}), a similar percentage of increase in polyphenols was also observed in the juice obtained on the screw press (62% for Rubin and 65% for Mutsu).

Jaeger et al. [12] found that the release of polyphenols from coarse mash was lower than that from fine mash. Since the screw press crushes apples more finely than the basket press, more polyphenols are extracted to the juice. A similar observation was reported by Heinmaa et al. [11], who noticed a higher amount of individual polyphenols in the juice extracted on a belt press (which also crushes the apples during pressing) as compared to the rack-and-frame press.

The efficiency of polyphenol extraction on individual presses may also be influenced by the textural characteristics of the apples tested. It is worth mentioning that the greatest differences were observed in the Mutsu and Rubin varieties, which are characterized by lower cutting forces.

3.7. Effect of the Press Construction on Antioxidant Activity

The antioxidant capacity of a substance is defined as its ability to scavenge reactive oxygen species and electrophiles [46]. Antioxidant activity is a very important parameter of juice quality.

The effect of press construction on the antioxidant capacity of juices is presented in Figure 8.

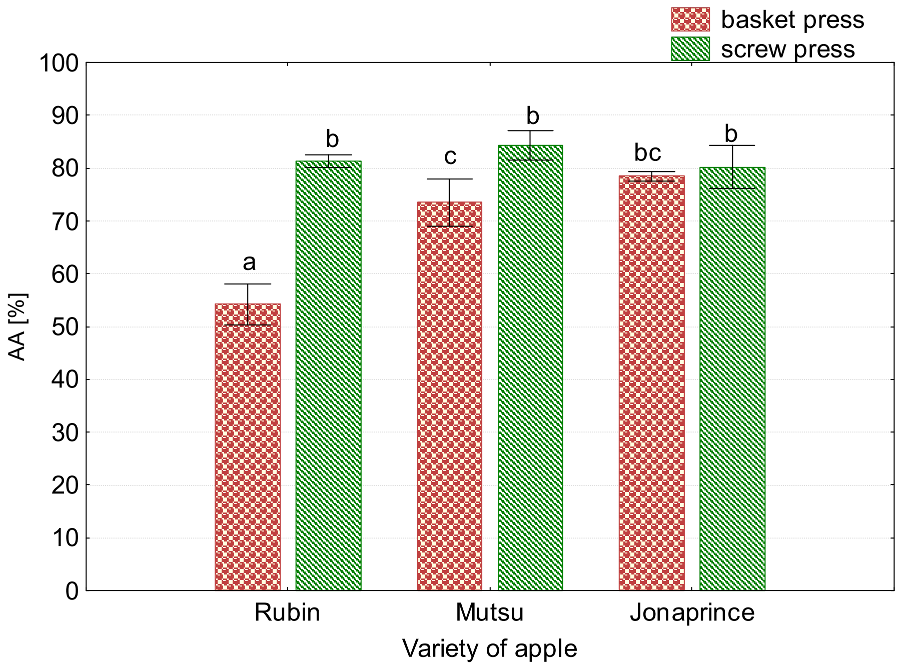

Figure 8. Antioxidant activity of the apple juice depending on the type of press machine.

The study showed that press construction had a significant effect on the antioxidant activity of the juice depending on the apple variety used. In the case of Rubin and Mutsu, the differences in antioxidant activity were statistically significant, whereas no statistically significant differences were found for Jonagold. Among the cultivars, the juice obtained from Mutsu showed the highest antioxidant activity.

The ability to scavenge free radicals was very closely related to the content of phenolic compounds in the apple juice. For the Jonagold, only small differences in the content of polyphenols in the juices were observed between the presses, which probably resulted in the absence of statistically significant differences in the antioxidant activity. Numerous studies have demonstrated a strong relationship between the polyphenols concentration and the antioxidant capacity of foods [44,47–50].

On the other hand, Wolfe et al. [51] did not find any relation between the antioxidant capacity and the TPC in apples. The lack of a correlation between these two properties may be related to the extraction process, apple varieties, percentage share of individual polyphenols, and the content of other compounds such as vitamin C, which may influence the antioxidant capacity.

Another determinant of the antioxidant activity is the degree of disintegration of the raw material. After cutting, defence metabolism is activated and synthesis and oxidation of phenolics occur simultaneously, modifying the initial phenolic composition of the fruit [46].

An effect of the processing technology on antioxidant capacity was also observed in other studies. For instance, Heinmaa et al. [11] reported that antioxidant capacity was highest in juices extracted on water press, followed by those extracted on belt press and rack-and-frame press. Their results also showed that the degrees of correlation between individual polyphenols and antioxidant activity were different.

Both antioxidant activity and TPC indicate the quality of a product with respect to its biological properties, and hence can be used in the process of quality control in the production of apple juices [52]. As indicated by our results, small-scale manufacturers should be advised to make use of a screw press to produce healthy and high-quality apple juice.

4. Conclusions

The present research demonstrated the varied efficiency of extraction of apple juice depending on the design of the press and apple variety. Generally, application of the screw press ensured higher yields of pressing compared to the basket press. The differences in the yield of extracted juice observed between the presses were related to the wider opening of cell membranes and release of greater amounts of nutrients facilitated by the screw press.

This study also showed the effect of press construction on the quality of apple juice. The juices extracted on screw press had higher TPC and antioxidant activity. This was probably due to the more intensive grinding and mixing of the raw material and the greater release of valuable bioactive components into the extracted juice. Additionally, the apple juices extracted on the screw press were characterized by a higher content of soluble solids, higher viscosity, and lower acidity. The obtained results indicate the necessity of further research on the use of screw presses for the production of juices from various varieties of apples in the farm conditions.

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