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Characterization of Household Potato Peel Waste as Source of Bio-active Compounds for Climate Resilient Solutions

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ABSTRACT

This apprehensive study was introduced to harness some principal bio-active compounds of potato peel waste with respect to its nutritional benefits for soil, humans and animal's health. In this study, the proximate analysis, methanol extraction and sensory evaluation research techniques were used to explore the characterization of household potato peel waste. The obtained data was analyzed through standard statistical procedure to check the level of significance. Through the proximate analysis and other testing techniques, it is constituted that potato peel is wasted which has many nutritional materials such as phenolic compounds, flavonoids, alkaloids, chlorogenic acid, protein, vitamins and minerals. These beneficial compounds are misspent in the form of household and industrial processing waste instead of advantageous utilization. During biochemical analysis, the biological activities of potato peel such as anti-oxidant, anti-inflammatory and anti-microbial properties were observed. It is concluded from the study that there are different useful, applicable and worthwhile by-product, brought up by recycling methods of wasted potato peel. These valuable products may be productive in various aspects such as in human, animal, and soil nutrition health as well as handy in household and environmental facet.

Keywords: *Potato Peels Waste, Polyphenols, Phytochemicals, Antioxidants, Environmental Facet.*

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Introduction

Potatoes, a crucial dietary staple, present a worldwide challenge in achieving cost-effective food production. In 2021, global potato output peaked at 376 million tons, primarily driven by China and India. FAO data reveals a global harvest of 18,132,694 hectares, with China contributing 94 million tons and Pakistan securing the 13th position with 5,872,960 metric tons. With a diverse range of over 5000 varieties, potatoes showcase substantial biological diversity, promoting effective food production and resistance to pests. More than 100 countries actively engage in potato-related research, processing, and the development of by-products. The production of potatoes plays a crucial role in ensuring food security in developing nations, contributing to over half of the world's output from these regions. Exploring the potential of by-products from potato processing holds promise in the food and pharmaceutical sectors, providing health benefits and mitigating environmental impact. This involves innovative uses of potato peel waste to improve human, soil, and animal nutrition. Current trends in the potato industry involve transforming fresh potatoes into higher-value goods for the fast-food and convenience-store industries. Despite declining fresh potato consumption, their nutritional benefits, including carbohydrates, high-quality protein, minerals, vitamin C, and B vitamins, remain noteworthy (Herrero, M.R Cifuentes et al., 2006).

However, potatoes are low in protein content and present a low-fat option when raw or boiled. Concerns arise in soil nutrition due to excessive use of commercial inorganic fertilizers, negatively impacting soil health, crop quality, and posing hazards to human health and the environment. To address this, the use of bio-based fertilizers, such as potato peel biochar, is suggested for its cost-effectiveness and environmental benefits. Increased potato plantations offer a potential source of potassium and phosphorus, if managed properly (Moiser N. et al.,2015). Polyphenols (PPs) possess distinctive features, offering diverse applications. Valorizing PP by converting waste into value-added items, such as fertilizer and animal feed, has been demonstrated in recent research. Utilizing fruit and vegetable waste for animal feed production provides high-quality and nutritious feeds due to PP's rich polyphenol content. PP, widely employed in cattle diets for its starch content, is a fuel source. Notably, potato skin enhances facial texture with its nutrient content. Potato peel and juice benefit the skin, containing phosphorous, sulfur, vitamin C, copper, phytonutrients, calcium, iron, vitamin B, and potassium. These components, including azelaic acid and cytokine, found in potatoes, effectively combat acne issues (Valdes Morales et al., 2014). Azelaic acid in potatoes minimizes blemishes, dark spots, and discoloration, acting as a natural moisturizer with anti-aging properties (Haftom Y. Gebrechristos et al., 2022). Examining the antioxidant effectiveness of freeze-dried aqueous potato peel extract (PPE) through recognized in vitro systems revealed significant inhibitory effects on deoxyribose oxidation. PPE displayed potent reducing and superoxide scavenging capacities, indicating its wide-ranging antioxidant activities. These results suggest the potential use of potato peel waste in health or functional foods to reduce oxidative stress, as they are typically discarded without efficient exploitation (Nandita Singh et al., 2004). A significant annual waste is produced in farming and food processing, prompting a search for eco-friendly solutions. Potatoes, known as the world's fourth most vital agricultural product, have seen a 5% annual growth in goods. Emerging economies now contribute 52% to global potato cultivation, up from 20% in the past two decades (Scharf, R, Wang et al., 2020).

The rise in processed food consumption, driven by urbanization and improved finances in emerging nations, results in substantial potato peel byproducts. Ranging from 15 to 40% of the initial product mass, this peel waste is economically and environmentally unfavorable. The high phenol content in potatoes calls for using peel residues as antioxidants in food systems to counteract environmental contamination caused by microbial decay. It's crucial to find environmentally friendly uses for potato peels to mitigate their negative impact on the environment and financial losses in processing sectors (Valdes Morales et al., 2014). To curb food waste and harness the global significance of potatoes, utilizing potato peels in processing has emerged as a new technique. The escalating demand for potatoes has spurred growth in processing industries, generating

substantial amounts of potato peels. Recognizing the biological value of this by-product, it is crucial to repurpose it to prevent decomposition and environmental pollution. This step not only addresses waste management but also taps into the beneficial potential of these by-products, particularly in industries dealing with potato and potato peel processing. The changing landscape in potato cultivation highlights the bioactive compounds present in potato peels, including glycoalkaloids and polyphenols, making them valuable sources of natural antioxidants and metabolites such as starch, polysaccharides, and dietary fibers sources.

Recycling this waste is a challenge due to restrictions on preventing environmental issues. Understanding the chemical composition of potato peel is essential for developing environmentally friendly approaches. Phenolic compounds in potato peel contribute to antioxidant properties, while fatty acids and lipids are linked to antibacterial effects. As the reliance on machined potato products grows, peel wastage increases, emphasizing the need for sustainable alternatives to minimize waste and dependence on fossil sources (Leo, L, Leone et al., 2008). Recent years have witnessed a surge in research on potato peel waste, evident from a significant increase in scholarly papers. Collaboration among scientists, nutritionists, and environmentalists highlights a growing interest in leveraging potato peel waste. The food processing industry, a major global player, generates substantial organic waste that, when managed improperly, can lead to harmful emissions. Utilizing potato peel as a foundation for economically valuable substances like dietary fiber biopolymers and antioxidants can address this issue. Globally, the processing industry produces 70-140 thousand tons of peels annually (Kanatt, S, Chander et al., 2005). While potato peel waste is commonly used for low-value animal feed or biogas, recent studies emphasize its potential loss of valuable nutrients. Efforts are underway to valorize potato peel waste at an industrial level, acknowledging its underutilization (Sanchez Maldonado et al., 2014). Financial sustainability in waste disposal and processing development is a central concern. Despite the need for treatment before use in animal feed, it proves effective for multi-gastric animals. This review summarizes initiatives, covering bioactive components, nutritional considerations, biotechnological usage, livestock feed, and other industrial applications of potato peels (Pang YZ Liu et al., 2008). Steam-peeled potato peels, extruded at 110–150 °C with 30–35% moisture, exhibited higher lignin and dietary fiber but lower starch levels. Abrasion during peeling reduced lignin, yet both methods increased soluble non-starch polysaccharides. Resistant starch development was linked to insoluble fiber from extruded steam peels (Schieber et al., 2009). Hand-peeled potato peel yielded 63% fiber on a dry weight basis, comprising hemicellulose, lignin, cellulose, and pectin components, with various commercial applications (K.Habeebullah et al., 2010). The success of marketing potatoes depends on customer decisions influenced by preparation technique, cooking methods, and age-related preferences. Potatoes (Solanum tuberosum) face global production challenges from biotic and abiotic stressors, leading to yield losses. Pest infestation, viral diseases, and oomycete pathogens contribute to contaminants. Genetic engineering presents both advantages and disadvantages, impacting production costs, insecticide use, and nutritional value (Hui Duan, J. Agric et al., 2022). The rapid spread of commercially cultivated genetically modified crops reached 442 million hectares across 13 countries in 2000, primarily focusing on insect- or herbicide-resistant varieties. There are conflicting statements about its environmental impact, with concerns about ecosystem services and biodiversity. While reducing pesticide applications and soil erosion, genetically modified crops require a thorough assessment of both risks and benefits (Lovei et al., 2023). Genetically modified food, despite uncertainties reflected in patents, has the potential to alleviate world poverty and environmental issues. However, in European nations, public distrust and protests surround transgenic usage (Kezis et al., 1979). The study aims to investigate the frequency of consuming genetically modified food, analyzing purchasing patterns and influential factors among consumers. The approach connects modified usage to competence, environmental impact, and human health (Boccia & Flavio, 2015).

Materials and Methods

The present study was conducted in the nutritional

lab at the Department of Home Economics, Government College University Faisalabad. Potato peel waste of local variety from local food market was procured in the whole procedure. The whole potato stock was satisfactorily washed and cleaned before getting potato peel. Objectionable impurities were removed which could cause the unwanted results. Then peel was obtained after utilizing potato flush which was stored under favorable condition and environment for further process. Samples were processed under oven drying and stoves heating to determine ash content, fat content of potato peel waste which was analyzed by soxhlet method. A dried free of fat sample was used for determination of crude fiber by enzymatic digestion. Protein content of potato peel waste was determined by Kjeldhal apparatus. A generous amount of potato peel was digested by adding digested tables and sulfuric acid. Process was performed in low temperature in water bath after this enhance temperature until transparent greenish color seemed. Flavonoids are the biggest class of polyphenols and their medicinal potential has been explored. The ash samples were dissolved in 1% hydrochloric acid and the solutions were used for the determination of the following minerals: Iron, zinc, sodium, calcium, manganese, magnesium, copper chromium, potassium, and boron by using Atomic Absorption Spectrometry

Statistical analysis

The measurements were performed in triplicate for each sample and results were expressed as mean value standard deviation. Statistical analysis was performed using IBM SPSS Statistics 20 as described by Nour et al. (2018).

Results and Discussion

To explore the nutritional and chemical composition of wastes generated from potato processing in the product manufacturing and processing industries and households this piece of research had planned. By various ways using different technological approaches, findings were concluded. Proximate analysis of potato peel was done as well as total phenolic content, total flavonoids content, antioxidant activity of active ingredients from potato peel were concluded. Different mineral content of potato peel waste was also analyzed. Furthermore, the concluding step was to subject the collected data during trials, to statistical analysis, for the purpose to estimate the level of significance of potato peel that can be used as a beneficial waste through which a lot of by-products can be manufactured. Three type of potato peel verities were analyzed which are VOGUE, CONSTANCE and KURODA. Proximate analysis, phenolic content, flavonoids content, antioxidant activity and minerals content of these all types were done. Proximate analysis consists of major findings and content of moisture, ash, crude protein, crude fiber, crude fat as well as NFE which is nitrogen free extract. Considering the three trials which were done to conclude the findings, the main bio=active compounds were analyzed. The final results of further findings and outcomes obtained during the research work are presented below accordingly:

Moisture Content

The laboratory tests were done three time to find the moisture content of potato peel waste. There were three types of dry potato peel powder. Dry powder of vogue peel waste, dry powder of Constance peel and dry powder of kuroda peel. First of all, sample of dry peel powder of vogue was taken for proximate analysis. According to the findings, after first trial to find the moisture content from vogue peel powder sample, value was 65.2±0.10. After second trial the value was 65.5±0.10. After last trial to find moisture content of potato peel waste from vogue Variety was 65.8±0.10. Then, moisture content of Constance variety was concluded by Proximate analysis. A sample of Constance potato peel dry powder was taken. After first trial, value of moisture content was 69.1±0.10. After second trial value of moisture content was 69.4±0.10. After the last trial, value of moisture content was again 69.4±0.10 as same as the value was after second trial. At last, trials of last variety of potato was done which is Kuroda. Reading was 76.6±0.10 after first trial of Kuroda dry peel powder. After second trial value was 77.4±0.10. After last trial the value of moisture content was 78.1g/100g±0.10. The lower the moisture content better the Quality is. Because higher moisture content decreases the shelf life of fruits and vegetables. Due to the high moisture content of potato peel in any food product or fruits and vegetables can make it prone to physio chemical as well as microbial spoilage and deterioration. That's why a drying procedure is required to

mitigate, decrease and diminish any kind of the additional damage of product. As well as it makes safe storage of product as it allows safe storage. Potato flesh has higher content of moisture as compared to the peel. but peel itself consists a wide range of moisture in it. The increased content of the moisture in flesh make it more susceptible to spoilage but alone with disadvantages, peel itself has a lot of advantages as it's usage is beneficial in a lot of ways as discussed in previous part of research. If we follow the avoidance rules the by avoiding and managing moisture content of potato, it's peel and many other products can be a key variable in many industries regarding manufacturing and processing of products. The moisture content levels reported by other investigations with or even exceed those reported here. There was a significant and specific amount of moisture in potato peel according to Bellumori et al. (2020). Moisture content that was obtained is 72.7g/100g. There was a wide range of results of moisture content obtained by Proximate analysis done by Diana Jimenez Champi in 2023. Furthermore, moisture content of Imila Negra, Imilla Coroda and Runa was 70.2g/100g, 73.7g/100g and 74.9g/100g respectively. (D. Jimenez *et al*., 2023)

Proximate composition of potato peel waste

Table 1: *Moisture content of potato peel waste from Vogue per 100gram*

Trials	Value in sample (g/100mg)
T_1	65.2±0.10
T_2	65.5±0.10
T_3	65.8±0.10

Table 2: *Moisture content of potato peel waste from Constance per 100gram*

Trials	Value in sample (g/100mg)
T_1	69.1±0.10
T_2	69.4±0.10
T_3	69.4±0.10

Table 3: *Moisture content of potato peel waste from Kuroda per 100gram*

Trials	Value in sample (g/100mg)
T_1	76.6±0.10
T_2	77.4±0.10
T_3	78.1±0.10

Ash content

Ash content is the amount of an inorganic residue, which is obtained when a sample or organic residue or sample has been burned away the remaining inorganic amount is known as ash. Ash content of any substance or sample is necessary to extract because this content has a great impact that it can influence different characteristics which also includes characteristics of food and its physio chemical as well as nutritional values and properties of food substances. After performance, my findings were in three different values because the tests were done three time to find the ash content of potato peel waste. There were three types peel powder dry powder of vogue peel

waste, dry powder of Constance peel and dry powder of Kuroda peel. First of all, sample of dry peel powder of vogue was taken for proximate analysis. According to my findings, after first trial to find the ash content from vogue peel sample, value was 0.12±0.10. After second trial the value was 0.13±0.02. After last trial to find ash content of potato peel waste from vogue Variety was 0.13±0.02. Then, ash content of Constance variety was concluded by Proximate analysis. A sample of Constance potato peel dry powder was taken. After first trial, value of ash content was 0.39±0.02. After second trial value of moisture content was 0.40±0.10. After the last trial, value of ash content was again 0.41±0.10. At last, trials of last variety of potato were done which is Kuroda. Reading was 0.44±0.10 after first trial of Kuroda dry peel powder. After second trial value was 0.45±0.10. After last trial the value of ash content was 0.45g/100g±0.10. As well as by another researches some as content was compared. There was a specific and significant amount of ash in potato peel that was 1.2g/100g. (Bellumori *et al*., 2020). The ash content levels reported by other investigations are also reported here. There was a wide range of results of ash content obtained by Proximate analysis done by Diana Jimenez Champi in 2023. Furthermore, moisture content of Imila Negra, Imilla Colorada and Runa was 1.7g/100g, 1.3g/100g and 0.9g/100g respectively (D. Jimenez *et al*., 2023).

Crude protein content

Protein plays a noteworthy and remarkable role in diet of human beings as it is an essential major macronutrient. The nutritional value of protein in foods cannot be replaced by any of other nutrients or any other molecule. Content of protein is estimated in foods as crude protein content. By estimating the nitrogen concentration of sample and by multiplying number by unknown factor is considered as an explicit and reliable method to get the crude protein content. Total concentration of nitrogen content in the food is termed as a measure of its concentration/content of protein because we all know this fact very well that protein is made up of Amino acids and nitrogen is an essential component of amino acids. In protein there is not all content of nitrogen is available, therefore, using crude protein as measurement may overestimate original quantity of protein in a meal. Many researches have been done to obtain the crude protein content in various foods and mainly in potato peels. A research done by Bellumori conclude the crude protein content of potato variety Puma Makin, which is about 4.4g/100gram (Bellumori et al., 2020). After performance, my findings were in three different values because the tests were done three time to find the crude protein content of potato peel waste. There were three types peel powder dry powder of vogue, Constance peel and dry powder of kuroda peel. First of all, sample of peel of vogue was taken. According to my findings, after first trial to find the crude protein content from vogue peel sample, the value was 2.74±0.10. After second trial the value was 2.75±0.02. After last trial to find crude protein content of potato peel waste from vogue Variety was 2.76±0.02. Then, crude protein content of Constance variety was concluded by Proximate analysis. A sample of Constance potato peel dry powder was taken. After first trial, value of crude protein content was 4.41±0.10. After second trial value of protein content was 4.41±0.10. After the last trial, value of protein content was 4.42±0.10. At last, trials of last variety of potato was done which is Kuroda. Reading was 2.20±0.10 after first trial of Kuroda dry peel powder. After second trial value was 2.24±0.10. After last trial the value of protein content was 2.26g/100g±0.10. Crude protein content levels reported by other investigations are also reported here.

Crude fat content

According to the findings, after first trial to find the crude fat content from vogue peel sample, the value was 1.29±0.02. After second trial the value was 1.31±0.02. After last trial to find crude fiber content of potato peel waste from vogue Variety was 1.31±0.02. Then, crude fat content of Constance variety was concluded by Proximate analysis. A sample of Constance potato peel dry powder was taken. After first trial, value of crude fat content was 1.18±0.02. After second trial value of moisture content was 1.21±0.10. After the last trial, value of moisture content was again 1.23±0.10. In last, trials of last variety of potato was done which is Kuroda. Reading was 1.11±0.10 after first trial of Kuroda dry peel powder. After second trial value was 1.15±0.10. After last trial the value of ash content was 1.16g/100g±0.10. Crude fat content levels reported by other investigations are also reported

here.

Crude Fiber content

Principle of crude fiber is, the insoluble residue is freed of soluble material water Washing, filtration as well as ashing. Crude fiber importantly plays a lot or roles in the diets of human beings. It is now according to new researches considered as important macro nutrition as its significance is so high. And, due to its beneficial usage it is increasingly being used as many main meals, by products etc. It also plays elucidating role with the goal to lower child level, improving digestive health as well as dietary recommendations increases more fiber consumption. To find out the crude fiber content of potato peel waste, there were three types of dry potato peel powder were used. Dry powder of vogue peel waste, dry powder of Constance peel and dry powder of kuroda peel. First of all, sample of dry peel powder of vogue was taken for proximate analysis. According to my findings, after first trial to find the crude fiber content from vogue peel powder sample, value was 5.91±0.10. After second trial the value was 5.92±0.10. After last trial to find crude fiber content of potato peel waste from vogue Variety was 5.93±0.10. Then, crude fat content of Constance variety was concluded by Proximate analysis. A sample of Constance potato peel dry powder was taken. After first trial, value of fiber content was 4.67±0.10. After second trial value of crude fiber content was 4.78±0.10. After the last trial, value of crude fiber content was 4.79±0.10. In last, trials of last variety of potato was done which is Kuroda. Reading was 2.80±0.10 after first trial of Kuroda dry peel powder. After second trial value was 2.81±0.10. After last trial the value of crude fiber content was 2.82g/100g±0.10. The higher the crude fiber content better the Quality and important of food product. Because higher crude fiber content has many benefits. The crude fiber content levels reported by other investigations are also reported here. Approximately, 2.5g/100gram fiber is present in the peel of potato (Al-Weshahy *et* al., 2012).

According to a research, the proportion of fiber in peels depends on the peeling process, with friction peeling of potatoes leading to less nutritional fiber and more starch than steam peeling. The crude fiber content of raw protein and peel flours varied in a non-significant way. The crude fiber level of potato flesh powder was lower than that of peel powders, as predicted.

Total Phenolic Content (TPC)

Potato peels are notably high quality source of phenolic acids. Better qualities of potato peel have higher contents of phenolic acids. Since approximately more than half of phenolic content and many other nutrients are present in the outer layer peel and the tissues that adjoin the outer skin. Sample of dry peel powder of vogue was taken for analysis. According to the findings, the phenolic content from vogue peel powder sample, value was 91.69±0.09. After second trial the value was 92.38±0.10. After last trial to find phenolic content of potato peel waste from vogue Variety was 93.57±0.10. Then, phenolic content of Constance variety was concluded by analysis. A sample of Constance potato peel dry powder was taken. After first trial, value of phenolic content was 73.9±0.09. After second trial value of phenolic content was 74.2±0.10. After the last trial, value of total phenolic content was 75.5±0.10. In last, trials of last variety of potato was done which is Kuroda. Reading was 63.4±0.09, after first trial of Kuroda dry peel powder. After second trial value was 64.8±0.10. After last trial the value of total phenolic content was 65.7mg GAE/100g±0.10. The higher the phenolic content better the Quality and importance of food product. Because higher phenolic content means it's has a variety of acids that are good for human health and many other significant functions. The total phenolic content levels by many other research papers were also reported. Phenolic compounds are also serve as secondary metabolites. And plays many notable and remarkable function in the body too. Phenolic compounds have phenol units in their structures. They also serve in the body to fight with the free radicals as an antioxidant agent. Peel of potatoes consist of polyphenols, phenolic acids, flavonoids, and many other phenolic acids. Phenolic acids and these another compounds are responsible of various significant functions such as disease resistance etc (Al-weshahy *et al*., 2013).

Total Flavonoids Content (TFC)

Flavonoids have a control of many bioactivities such as antioxidant activity, anti-microbial activity, anti-cancer activities as well as anti-

inflammatory and anti-viral activity. Expect this, it also plays an unavoidable role in body and plants as it is so beneficial. They are found in many fruits, vegetables, food crops and coloring of flowers. The amount of flavonoids in colorful potato types is twice as high as that in white varieties. Consequently, the pigmentation of the peels and the potato cultivars have a significant impact on the content of these phenolic chemicals (Rasheed *et al*, 2022). According to the findings, after first trial to find the total flavonoids content from vogue peel sample, the value was 24.99±0.011. After second trial the value was 25.28±0.011. After last trial to find flavonoids content of potato peel waste from vogue Variety was 26.97±0.011. Then, total flavonoids content of Constance variety was calculated. A sample of Constance potato peel dry powder was taken. After first trial, value of flavonoid content was 21.09±0.011. After second trial value of finding flavonoids content was 22.45±0.011. After the last trial, value of flavonoid content was 23.79±0.011. At last, trials of last variety of potato was done which is Kuroda. Reading was 17.37±0.10 after first trial of Kuroda dry peel powder. After second trial value was 18.76±0.011. After last trial the value of flavonoid content was 19.45mg QE/100g±0.011.

Antioxidants Activity (AOA)

It has been demonstrated after various studies that, antioxidants are those significant compounds which have ability to interfere as well as to stop the oxidation in the body in the results, free radicals are unable to form. There were three types peel powder dry powder of vogue, Constance peel and dry powder of kuroda peel in this research. According to the findings, the total antioxidant activity from vogue peel sample, the value was 128.43±0.590. After second trial the value was 129.67±0.590. After last trial to find antioxidant activity of potato peel waste from vogue Variety was 130.82±0.011. Then, total antioxidant activity of Constance variety was concluded. A sample of Constance potato peel dry powder was taken. After first trial, value of antioxidant activity was 98.243±0.590. After second trial value of finding antioxidant activity was 99.675±0.590. After the last trial, value of antioxidant activity was 100.82±0.590. At last, trials of last variety of potato was done which is Kuroda. Reading was 98.243±0.590 after first trial of Kuroda dry peel powder. After second trial value was 98.675±0.590. After last trial the value of antioxidant activity was 100.82 mmol Trolox QE/100g±0.590. The antioxidant activity which was found in potato peel was approximately 80.82%.

Minerals Content

The total mineral content of potato peel waste was obtained with some variation. There were three types of peel powders, dry powder of vogue, Constance peel and dry powder of kuroda peel. First of all, sample of peel of vogue was taken. According to the findings, after first trial to find the total mineral content from vogue peel sample, the values minerals were phosphorus 64.895mg/100gram, calcium 28.675mg/100gram, sodium 60.342mg/100gram, iron 15.542mg/100g, manganese 8.560mg/100gram, potassium 530.771mg/100g, copper 2.4666mg/100g, chromium 0.5731mg/100gram, zinc 8.943mg/100mg and boron 2.0614mg/100g. After second variety analysis the values were, phosphorus 54.235mg/100mg, 20.960 mg/100mg calcium, 51.335 mg/100mg sodium, 10.639 mg/100mg iron, 5.910 mg/100mg manganese, 425.20 mg/100mg potassium, 1.952 mg/100mg copper, 0.394 mg/100mg chromium, 5.384 mg/100mg zinc and 1.653 mg/100mg of boron. After last variety mineral analysis, values or mineral content was, 49.353 mg of phosphorus, 11.046 mg of calcium, 45.767 mg of sodium, 5.467 mg of iron, 2.341 mg of manganese, 301.178 mg of potassium, 1.101 mg of copper, 2.356 mg of chromium, 8.943 mg of zinc and of 0.951 mg of boron/ 100 grams. Mineral content of various varieties of potato peels were analyzed. These findings demonstrate the fact that the micronutrients and elemental content of potato tissue and cultivar vary. Peels from potatoes contain much more protein, fiber, ash, and minerals (with the possible exception Mg) than the interior. Nevertheless, meat has the largest amount of dry matter and total soluble solids concentrations. K is the most abundant mineral in the two portions of the potato tuber, followed by P, Mg, Ca, Fe, Zn, B, Mn, and Cu as well as Violetta peels contained the most ash, potassium, and magnesium, whereas Highland Burgundy Red peels contained the most protein, fiber, calcium, and magnesium. The Highland Burgundy Red cultivar has the greatest dry matter and total

soluble solids content (Vaitkevičienė *et al*., 2019).

Conclusion

The potato peel has lot of biochemical and biological properties which has been wasted during processing at household level and industrial setups. These valuable phenolic compounds such as chlorogenic acid and caffeic acid, flavonoids and antioxidant contents can be used in different bi-products in natural food preservatives and food supplements. Its potential use can be in eco-friendly soaps and detergents, due to its anti-inflammatory property helps in reducing inflammation in human and animal; health. Potato peels are enriched with nutrients which may utilize in soil nutrition to boost microbial activity as well as handy in household and climate resilience facet.

Conflict of Interest

The authors showed no conflict of interest.

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