

Quince and cabbage wastes valorization: some recent options

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Abstract. This paper aimed to present in a summarized form, using the descriptive approach, some recent opportunities for the valorization of two specific representatives of the numerous and heterogeneous in type and composition of fruit and vegetable wastes, namely quince waste and cabbage waste. Research on quince waste is mainly related to determining its composition, searching for valuable components in it, applying different extraction methods, characterizing waste from quince processing, identification and analysis of various compounds. Options for the valorization of cabbage waste are related, for example, to the development of adsorbents, polymer absorption gels, obtaining biochar, biogas production, exploring the possibilities of co-pyrolysis, detection and characterization of biologically active compounds, as well as use in animal nutrition. The development and application of new methods in order to achieve optimally effective valorization of fruit and vegetable waste, part of which are quince waste and cabbage waste, is among the main priority directions for future research.

1 Introduction

Effective management of fruit and vegetable waste, which represents a significant part of the total food waste stream, is among the top priorities in the global concept of sustainable goals and environmentally sound policies. The application of integrated methodologies of both conventional and emerging approaches and techniques at this stage of the development of modern society allows to explore in depth and unfold the full potential of fruit and vegetable waste, with a view to their proper treatment and appropriate valorization, following basic circular ecofriendly principles of safety and sustainability [1, 2].

This paper aims to present, using the descriptive approach, some recent options for the valorization of two specific representatives of the large fruit and vegetable waste stream, namely quince waste and cabbage waste.

2 Materials and methods

After the aim of the paper was formulated, a search was conducted with the keywords “quince waste” and “cabbage waste” using only the Scopus and Google Scholar databases. The

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selected publications present, with the help of a descriptive methodology, in a summarized form some guidelines and trends regarding research with a view to the utilization of the specified fruit and vegetable wastes. Book chapters are not the subject of consideration in this paper. A study of this type could be supplemented and updated subsequently.

3 Results and discussion

A brief bibliographic systematization of the scientific publications used in this paper in terms of some basic terms directly related to the subject under consideration shows that the term “waste/wastes” (on its own or as part of a word combination) is present both in the title and as a keyword in two thirds of the cited articles: [1 – 21]; also occurs only in the title: [22, 23], as well as only as a keyword: [24]. The term “peel/peels” may appear in the title [23 – 25] or both in the title and as a keyword [26]. The term “seed/seeds” can also be contained either in the title [27, 28] or both in the title and as a keyword [29]. Other terms present in the titles of cited articles are: “utilization” [2], [16], [28]; “valorization” [12], [23]; “sustainable” [6, 7], [23]; “biorefinery” [7].

In Table 1, some highlights of quince waste valorization options are summarized.

Table 1. Some highlights of quince waste valorization options.

Quince waste valorization highlights	Reference
fiber-rich products	[3]
compositions and functional properties	[4]
emulsion properties	[5]
slow pyrolysis – pectin compounds	[6]
pectin extraction	[7]
quince alcohol distillery waste characterization	[21]
canned quince compote – low-waste production	[22]
quince peel – functional food ingredients	[23]
quince peel – dietary fiber extraction	[24]
quince peel – bioactive ingredients and fiber concentrates	[25]
quince peels – bioactive compounds extraction	[26]
quince seed mucilage – edible coating for mandarin	[27]
quince seeds mucilage – characterization	[28]
quince seed mucilage – silver nanoparticles	[29]
quince pomace	[30]
quince – jam – antioxidant activity	[31]

The data presented in Table 1 show that the study of quince waste is mainly related to the characterization of its composition, establishing the presence of valuable components in it, the search for extraction methods, the study of quince processing waste, the identification and characterization of different compounds. All these directions are perfectly reasonable, following the logic that it is important to know the composition, structure and properties of

quince waste in order to outline future directions and develop strategies for their larger scale valorization.

In Table 2, some highlights of the options for valorization of cabbage waste are systematized in a summarized form.

Table 2. Some highlights of cabbage waste valorization options.

Cabbage waste valorization highlights	Reference
Congo red dye removal	[9]
Cd, Cu and Pb sorption	[18]
superabsorbent polymer gel	[13]
cabbage waste and maize straw co-ensiling system	[10]
biochar	[14]
biogas production	[11]
cabbage waste and tire waste co-pyrolysis	[17]
peroxidase	[8]
polyphenols, glucosinolates and antioxidant properties	[15]
waste cabbage leaves valorization	[12]
cabbage waste multi-stage utilization	[16]
dried cabbage waste – weaned pigs	[19]
dried cabbage waste – grower-finisher pigs	[20]

As is clear from Table 2, the valorization options for the utilization of cabbage waste are related to the development of adsorbents, polymer gels with absorbent properties, obtaining biochar, biogas production, exploring possibilities for co-pyrolysis, identification and characterization of biologically active compounds, as well as use in animal nutrition. There are various directions in which work is being done in the field of cabbage waste utilization, which shows the importance of this material as a potential raw material resource.

4 Conclusion

Fruit and vegetable waste, of which quince waste and cabbage waste are a part, represent a fairly widespread and easily accessible resource, the effective utilization of which can be achieved after developing an integrated approach to their management through the combined application of different strategies. Effective valorization of fruit and vegetable waste, in particular quince waste and cabbage waste, can be achieved after developing an integrated methodology for their utilization through joint application of different approaches and methodologies. Among the main directions for future research, the possibility of developing and applying new methods in order to achieve optimal treatment of fruit and vegetable waste could be highlighted.

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