

Organic Potatoes and Conventional Potatoes

Subjects: Agronomy | Plant Sciences | Horticulture

Contributor: Koffi Djaman, Komlan Koudahe

Interest in organic foods is increasing at a moment when humanity is facing a range of health challenges including the concern that some conventionally produced foods may pose possible adverse effects on human and livestock health. Consumers are showing increasing interest in organically grown potatoes due to their nutritional quality and health protection value.

Keywords: organic ; conventional ; potato ; quality ; disease

1. Introduction

Potato (*Solanum tuberosum* L.) is the fourth-largest crop produced worldwide after rice, wheat, and maize at a total annual production of 370, 504, 766, and 1150 million tons for potato, rice, wheat and maize, respectively ^[1]. Potato is adapted to a large range of geographical environments and climates ^[2].

Different factors affect the quality of the potato tubers. Nitrogen availability to potato plants is critical to plant growth and development, tuber yield, and quality. Nitrogen form and source are one of the main differences between conventional and organic potato production ^{[3][4][5][6][7]}. In addition, to control the numerous potential diseases and stabilize yield in potatoes, commercial growers apply a strict package of pesticides and high rate of nitrogen fertilizer ^{[8][9][10][11]}. Some undesirable residues can be accumulated in the potato tubers ^[12] and the soil ^[13] under conventional farming that can potentially affect human and animal health ^[14], and organic foods are therefore generally assessed as being healthier and of better taste than conventionally grown crops ^{[15][16]}.

2. Weed and Pest Management in Potato

Commercial potato growers follow rigorous herbicide application schedules throughout the conventional potato growing season and apply different pesticides. While conventional potato often starts by soil fumigation, organic potato often relies on the biofumigation provided by cover crops such as those of the Brassicaceae family. Boydston ^[17] reported that weeds should be managed in a holistic, intentional, and proactive manner if no herbicide is considered. Under organic farming, crop rotation, cover crop selection, planting pattern and timing in addition to healthy and appropriate seed material are the main aspects to be considered for successful weed management.

3. Nutrient Management

Both organic and conventional systems have adopted cover cropping to improve soil organic matter content and improve soil quality. Bio-fertilizers derived from microorganisms are an alternative to chemical and organic fertilizers. Bio-fertilizers derived from microorganisms are an alternative to chemical and organic fertilizers.

4. Potato Disease Occurrence and Intensity

Disease management is a serious challenge and threat to organic potato management and disease pressure depends on crop physiology and nutrient availability that confers plant tolerance to disease stressors ^{[18][19][20][21][22]}. Late blight, caused by *Phytophthora infestans*, is commonly thought to be the factor most limiting yield under organic practices ^[23]. Common scab (caused by *Streptomyces scabies*), silver scurf (caused by *Helminthosporium solani*), and soft rot (caused by *Pectobacterium* sp. and *Dickeya* sp.) may be detrimental to organic production systems. Organic farming relies on the agricultural practices to reduce and/or control diseases instead of applying chemical pesticides (Table 1). Larkin and Halloran ^[24] indicated that disease levels and crop production are influenced by crop management practices. Crop rotation plays a tremendous role in maintaining potato disease incidence at controllable levels. Through a process known as biofumigation, plants within the Brassicaceae family produce glucosinolates, which break down into volatile compounds that are toxic to several plant pathogens ^{[25][26][27][28][29][30][31][32]}.

5. Total Tuber Yield and Marketable Yield

Potato under organic production is subjected to different pests, diseases and limited available nutrients and consequently produces lower tuber yield compared to the conventionally grown potato (Table 1 and Table 2) [5][23][33][34][35][36][37][38][39]. Synthetic fertilizers, pesticides, and other non-organic inputs are not allowed under organic production, which infers challenges in nutrient and pest management under organic farming than conventional systems with lower marketable potato tuber yield in organic production [23][40][41][42]. In various studies, the yield of organically grown potato tubers is lower compared to the yield of the conventionally grown potato by 5–40% [8][43][44][45][46][47][48].

6. Tuber Specific Gravity and Dry Matter Content

Lombardo et al. [48] and Herencia et al. [49] reported higher dry matter content in organically fertilized potatoes, and other studies have also shown higher dry matter content in organically grown potatoes compared to conventional production systems [50][51][52]. However, Woese et al. [53] found no difference in potato dry matter content between the organically and conventionally grown potatoes.

7. Sugar and Starch Contents of Potato Tubers

Dramićanin et al. [54] found that starch content in the potato tubers may be considered an important indicator of the type of production, botanical origin, and ripening time and the sugar macro- and micro-components such as fructose, glucose, saccharose, sorbitol, trehalose, arabinose, turanose, and maltose were the main factors for the differentiation of production types, production years, and botanical origin of potato. An increase in total sugars was noted for organic potatoes when compared to conventional potatoes [55][56][57].

8. Nitrate Content of Potato Tubers

Lombardo et al. [6] found that the nitrate content in organically grown tubers was 34% less than in conventionally grown potatoes. Similarly, studies have shown lower amounts of dry matter [50][58], vitamin C [56], total amino acids [8], and total protein in organic potatoes [8][59].

In contrast, Divís et al. [60] reported that mean contents of crude protein and in protein content in dry matter were significantly higher in organically grown potato tubers than in tubers from conventional practice. They found that potato genotype or cultivar was the factor with the highest direct effect on crude protein and protein contents in the potato tubers.

9. Bioactive Compounds and Antioxidants Content in Potato Tubers

Brazinskiene et al. [61] found that the farming system had no significant effect on phenolic acid concentrations in the potato tubers while Keutgen et al. [62] found higher contents of phenolic compounds, flavonoids, and ascorbic acid in organically grown potato tubers than the conventionally grown potato tubers. Romero-Pérez et al. [63] found that flavonoids in plants are strongly impacted by genotype, the agroclimatic conditions, and the cultivation system. Interestingly, Lachman et al. [64] and Vaitkevičienė et al. [65] derived from their study that the colored-flesh potato genotypes have a greater impact on the anthocyanins content than the agricultural production system and they are not detected in white- or yellow-flesh potato tubers [65][66][67].

10. Mineral and Vitamin Contents

Lombardo et al. [68] investigated early potato tuber mineral contents under organic and conventional farming and found that the potato tubers contained more phosphorus (2.8 vs. 2.3 g kg⁻¹ of dry matter) and a comparable quantity of both magnesium and copper (on average 250 and 2.6 mg kg⁻¹ of dry matter, respectively) under organic farming than the conventional farming. Wszelaki et al. [55] found tuber skin and flesh to have significantly higher concentration in potassium, magnesium, phosphorus, sulfur, and copper under organic management than conventional practices, while iron and manganese contents were higher in the skin of conventionally grown potatoes.

Contradictory data have also been reported between the organically grown and conventionally grown potato with respect to vitamin C content [69][70][71]. Warman and Havard [69] found that there was no significant difference in vitamin C content of the potato tubers grown under organic and conventional practices. Conversely, other studies have reported higher vitamin C content in the organic potato tubers than in the conventional potato tubers [58][56][72].

11. Sensory Characteristics of Potato Tubers

Lombardo et al. [6] found that potato cultivars Ditta and Nicola were well suited to boiling with a delicate taste, firmness, and absence of blackening. Moreover, potato cultivars Arinda, Ditta, and Nicola grown organically had a better sensory performance after frying (strong taste and crisp flesh) than the conventionally grown potato. There was no significant difference in farming systems with regards to consistency, typical taste after boiling [6][56][73], or typical taste after frying; however, organically grown potato tuber showed higher crispiness and lower browning index [6]. Woese et al. [53] found no clear and consistent statements about the high sensorial quality of organic potatoes vs. conventional potatoes from different studies on the organoleptic quality in organic practices compared to the conventional practices.

Potato threshold concentration in solanine of $140 \mu\text{g g}^{-1}$ causes bitter taste, and solanine concentration greater than $200 \mu\text{g g}^{-1}$ creates a burning sensation in the throat and on the tongue [74]. Gilsenan et al. [16] found that the conventional potatoes had a lower dry matter content and a slightly softer texture than the organic potatoes. The conventional baked potato was also slightly softer, less adhesive, and wetter than the organic baked potato, but there was no significant difference between the organic and conventional baked potato samples for the sensory attributes of appearance, aroma, texture, and taste acceptability [16]. Brazinskiene et al. [61] reported that odor and taste intensity of the potato samples were not affected by farming practices.

References

1. FAO Statistical Database 2021. Available online: (accessed on 19 March 2021).
2. Horton, D.E.; Anderson, J.L. Potato production in the context of the world and farm economy. In *The Potato Crop*; Harris, P.M., Ed.; Chapman and Hall: London, UK, 1992; pp. 804–805.
3. Gastal, F.; Lemaire, G. N uptake and distribution in crops: An agronomical and ecophysiological perspective. *J. Exp. Bot.* 2002, 53, 789–799.
4. Wang, Z.H.; Zong, Z.Q.; Li, S.X.; Chen, B.M. Nitrate accumulation in vegetables and its residual in vegetable fields. *Environ. Sci.* 2002, 23, 79–83.
5. Van Delden, A.; Schroder, J.J.; Kropff, M.J.; Grashoff, C.; Booi, R. Simulated potato yield, and crop and soil nitrogen dynamics under different organic nitrogen management strategies in the Netherlands. *Agric. Ecosyst. Environ.* 2003, 96, 77–95.
6. Lombardo, S.; Pandino, G.; Mauromicale, G. Nutritional and sensory characteristics of “early” potato cultivars under organic and conventional cultivation systems. *Food Chem.* 2012, 133, 1249–1254.
7. Lombardo, S.; Pandino, G.; Mauromicale, G. The effect on tuber quality of anorganic versus a conventional cultivation system in the early crop potato. *J. Food Compos. Anal.* 2017, 62, 189–196.
8. Maggio, A.; Carillo, P.; Bulmetti, G.S.; Fuggi, A.; Barbieri, G.; De Pascale, S. Potato yield and metabolic profiling under conventional and organic farming. *Eur. J. Agron.* 2008, 28, 343–350.
9. Mauromicale, G.; Ierna, A. Patata primaticcia. In *Fisionomia e Profili di Qualità dell’Orticoltura Meridionale*; Bianco, V.V., La Malfa, G., Tudisca, S., Eds.; Arti Grafiche Siciliane: Palermo, Italy, 1999; pp. 275–296.
10. Leonel, M.; do Carmo, E.L.; Fernandes, A.M.; Soratto, R.P.; Eburneo, J.A.M.; Garcia, E.L. Chemical composition of potato tubers: The effect of cultivars and growth conditions. *J. Food Sci. Technol.* 2017, 54, 2372–2378.
11. Djaman, K.; Higgins, C.; Allen, S.; Komlan Koudahe, K.; Lombard, K. Tuber yield, water productivity and post-harvest quality of sprinkler-irrigated chip potato (*Solanum tuberosum* L.) under a semiarid climate. *J. Agric. Hortic. Res.* 2019, 2, 1–9.
12. Bacchi, M.A.; De Nadai Fernandes, E.A.; Tsai, S.M.; Santos, L.G.C. Conventional and organic potatoes: Assessment of elemental composition using k0-INAA. *J. Radioanal. Nucl. Chem.* 2004, 259, 421–424.
13. Navarro Pedreno, J.; Moral, R.; Gomez, I.; Mataix, J. Reducing nitrogen losses by decreasing mineral fertilization in horticultural crops of eastern Spain. *Agric. Ecosyst. Environ.* 1996, 59, 217–221.
14. Santamaria, P. Nitrate in vegetable: Toxicity, content, intake and EC regulation. *J. Sci. Food Agric.* 2006, 86, 10–17.
15. Hoefkens, C.; Vandekinderen, I.; De Meulenaer, B.; Devlieghere, F.; Baert, K.; Sioen, I.; De Henauw, S.; Verbeke, W.; Van Camp, J. A literature-based comparison of nutrient and contaminant contents between organic and conventional vegetables and potato. *Br. Food J.* 2009, 111, 1078–1098.
16. Gilsenan, C.; Burke, R.M.; Barry-Ryan, C. A study of the physicochemical and sensory properties of organic and conventional potatoes (*Solanum tuberosum*) before and after baking. *Int. J. Food Sci. Technol.* 2010, 45, 475–481.

17. Boydston, R.A. Managing weeds in potato rotations without herbicides. *Am. J. Pot Res.* 2010, 87, 420–427.
18. Davies, B.; Eagle, D.; Finney, B. *Soil Management*, 5th ed.; Farming Press: Ipswich, UK, 1993.
19. Mulder, A.; Turkensteen, L.J. *Potato Diseases. Diseases, Pests and Defects*; Aardappelwereld and NIVAP: The Hague, The Netherlands, 2005; 280p.
20. Czajkowski, R.; Pérombelon, M.C.M.; Van Veen, J.A.; Van der Wolf, J.M. Control of blackleg and tuber soft rot of potato caused by *Pectobacterium* and *Dickeya* species: A review. *Plant. Pathol.* 2011, 60, 999–1013.
21. Dordas, C. Role of nutrients in controlling plant diseases in sustainable agriculture: A review. *Agron. Sustain. Dev.* 2008, 28, 33–46.
22. Huber, D.; Römheld, V.; Weinmann, M. Relationship between nutrition, plant diseases and pests. In *Mineral Nutrition of Higher Plants*; Marschner, P., Ed.; Academic Press: Oxford, UK, 2012; pp. 283–298.
23. Finckh, M.R.; Schulte-Geldermann, E.; Bruns, C. Challenges to organic potato farming: Disease and nutrient management. *Potato Res.* 2006, 49, 27–42.
24. Larkin, R.P.; Halloran, J.M. Management effects of disease suppressive rotation crops on potato yields and soilborne diseases and their economic implications in potato production. *Am. J. Potato Res.* 2014, 91, 429–439.
25. Larkin, R.P.; Griffin, T.S. Control of soilborne diseases of potato using Brassica green manures. *Crop Prot.* 2007, 26, 1067–1077.
26. Melrose, J. The Glucosinolates: A sulphur glucoside family of mustard anti-tumour and antimicrobial phytochemicals of potential therapeutic application. *Biomedicines* 2019, 7, 62.
27. Rubel, M.H.; Abuyusuf, M.; Nath, U.K.; Robin, A.H.K.; Jung, H.J.; Kim, H.T.; Park, J.I.; Nou, I.S. Glucosinolate profile and glucosinolate biosynthesis and breakdown gene expression manifested by black rot disease infection in cabbage. *Plants* 2020, 9, 1121.
28. Sarwar, A.; Latif, Z.; Zhang, S.; Zhu, J.; Zechel, D.L.; Bechthold, A. Biological control of potato common scab with rare isatropolone C compound produced by plant growth promoting *Streptomyces* A1RT. *Front. Microbiol.* 2018, 9, 1126.
29. Kirkegaard, J.; Sarwar, M. Biofumigation potential of brassicas. *Plant. Soil* 1998, 201, 71–89.
30. Matthiessen, J.N.; Kirkegaard, J.A. Biofumigation and enhanced biodegradation: Opportunity and challenge in soilborne pest and disease management. *Crit. Rev. Plant Sci.* 2006, 25, 235–265.
31. Ngala, B.M.; Haydock, P.J.; Wood, S.; Back, M.A. Biofumigation with Brassica juncea, Raphanus sativus and Eruca sativa for the management of field populations of the potato cyst nematode *Globodera pallida*. *Pest. Manag. Sci.* 2014, 71, 759–769.
32. Vega-Álvarez, C.; Francisco, M.; Soengas, P. Black rot disease decreases young Brassica oleracea plants' biomass but has no effect in adult plants. *Agronomy* 2021, 11, 569.
33. Clark, M.S.; Horwath, W.R.; Shennan, C.; Scow, K.M.; Lantni, W.T.; Ferris, H. Nitrogen, weeds and water as yield-limiting factors in conventional, low-input, and organic tomato systems. *Agric. Ecosyst. Environ.* 1998, 73, 257–270.
34. Offermann, F.; Nieberg, H. Economic performance of organic farms in Europe. In *Organic Farming in Europe. Economics and Policy*; Universität Hohenheim: Stuttgart, Germany, 2000; Volume 5.
35. Van Delden, A. Yield and growth components of potato and wheat under organic nitrogen management. *Agron. J.* 2001, 93, 1370–1385.
36. Möller, K.; Habermeyer, J.; Zinkernagel, V.; Hans-Jürgen, R. Impact and interaction of nitrogen and *Phytophthora infestans* as yield-limiting and yield-reducing factors in organic potato (*Solanum tuberosum* L.) crops. *Potato Res.* 2007, 49, 281–301.
37. Haase, T.; Schuler, C.; Hess, J. The effect of different N and K sources on tuber nutrient uptake, total and graded yield of potatoes (*Solanum tuberosum* L.) for processing. *Eur. J. Agron.* 2007, 26, 187–197.
38. Lynch, D.H.; Sharifi, M.; Hammermeister, A.; Burton, D. Nitrogen management in organic potato production. In *Sustainable Potato Production: Global Case Studies*; He, Z., Larkin, R., Honeycutt, W., Eds.; Springer: Berlin/Heidelberg, Germany, 2012.
39. Palmer, M.W.; Cooper, J.; Tétard-Jones, C.; Średnicka-Tober, D.; Barański, M.; Eyre, M.; Shotton, P.N.; Volakakis, N.; Cakmak, I.; Oztruk, L.; et al. The influence of organic and conventional fertilisation and crop protection practices, preceding crop, harvest year and weather conditions on yield and quality of potato (*Solanum tuberosum*) in a long-term management trial. *Eur. J. Agron.* 2013, 49, 83–92.
40. Rees, H.W.; Chow, T.L.; Zebarth, B.J.; Xing, Z.; Toner, P.; Lavoie, J.; Daigle, J.L. Effects of supplemental poultry manure applications on soil erosion and runoff water quality from a loam soil under potato production in northwestern

41. Sharifi, M.; Lynch, D.H.; Zebbarth, B.J.; Zheng, Z.; Martin, R.C. Evaluation of nitrogen supply rate measured by in situ placement of Plant Root Simulator™ probes as a predictor of nitrogen supply from soil and organic amendments in potato crop. *Am. J. Pot Res.* 2009, 86, 356–366.
42. Nelson, K.L.; Lynch, D.H.; Boiteau, G. Assessment of changes in soil health throughout organic potato rotation sequences. *Agric. Ecosyst. Environ.* 2009, 131, 220–228.
43. Hansen, J.G.; Koppel, M.; Valskyte, A.; Turka, I.; Kapsa, J. Evaluation of foliar resistance in potato to *Phytophthora infestans* based on an international field trial network. *Plant Pathol.* 2005, 54, 169–179.
44. Razukas, A.; Jundulas, J.; Asakaviciute, R. Potato cultivars susceptibility to potato late blight (*Phytophthora infestans*). *Appl. Ecol. Environ. Res.* 2008, 6, 95–106.
45. Mourão, I.; Brito, L.M.; Coutinho, J. Yield and quality of organic versus conventional potato crop. In Proceedings of the 16th IFOAM Organic World Congress, Modena, Italy, 16–20 June 2008; Available online: (accessed on 10 March 2021).
46. De Ponti, T.; Rijk, B.; van Ittersum, M.K. The crop yield gap between organic and conventional agriculture. *Agric. Syst.* 2012, 108, 1–9.
47. Asakaviciute, R.; Brazinskiene, V.; Razukas, A. Late blight *Phytophthora infestans* (Mont.) de Bary resistance evaluation in ten Lithuanian potato cultivars. *Icel. Agric. Sci.* 2013, 26, 45–48.
48. Lombardo, S.; Pandino, G.; Mauromicale, G. The influence of growing environment on the antioxidant and mineral content of early crop potato. *J. Food Compos. Anal.* 2013, 32, 28–35.
49. Herencia, J.F.; Garcia-Galavis, P.A.; Ruiz Dorado, J.A.; Maqueda, C. Comparison of nutritional quality of the crops grown in an organic and conventional fertilized soil. *Sci. Hortic.* 2011, 129, 882–888.
50. Moschella, A.; Camin, F.; Miselli, F.; Parisi, B.; Versini, G.; Ranalli, P. Markers of characterization of agricultural regime and geographical origin in potato. *Agroindustria* 2005, 4, 325–332.
51. Kazimierczak, R.; Srednicka-Tober, D.; Hallmann, E.; Kopczynska, K.; Zarzynska, K. The impact of organic vs. conventional agricultural practices on selected quality features of eight potato cultivars. *Agronomy* 2019, 9, 799.
52. Pither, R.; Hall, M.N. Analytical survey of the nutritional composition of organically grown fruit and vegetables. In Technical Memorandum No. 597, MAFF Project No. 4350; The Campden Food and Drink Research Association: Chipping Campden, UK, 1990; p. 31.
53. Woese, K.; Lange, D.; Boess, C.; Bogl, K.W. A comparison of organically and conventionally grown foods—Results of a review of the relevant literature. *J. Sci. Food Agric.* 1997, 74, 281–293.
54. Dramicanin, A.M.; Andric, F.L.; Poštic, D.; Momirovic, N.M.; Milojkovic-Opsenica, D.M. Sugar profiles as a promising tool in tracing differences between potato cultivation systems, botanical origin and climate conditions. *J. Food Compos. Anal.* 2018, 72, 57–65.
55. Wszelaki, A.L.; Delwiche, J.F.; Walker, S.D.; Liggett, R.E.; Scheerens, J.C.; Kleinhenz, M.D. Sensory quality and mineral and glycoalkaloid concentrations in organically and conventionally grown redskin potatoes (*Solanum tuberosum*). *J. Sci. Food Agric.* 2005, 85, 720–726.
56. Hajšlová, J.; Schulzová, V.; Slanina, P.; Janné, H.K.; Andersson, K.E. Quality of organically and conventionally grown potatoes: Four-year study of micronutrients, metals, secondary metabolites, enzymic browning and organoleptic properties. *Food Addit. Contam.* 2005, 22, 514–534.
57. Rembialska, E. Quality of plant products from organic agriculture. Review. *J. Sci. Food Agric.* 2007, 87, 2757–2762.
58. Rembialska, E. Comparison of the contents of nitrates, nitrites, lead, cadmium and vitamin C in potatoes from conventional and ecological farms. *Pol. J. Food Nutr. Sci.* 1999, 8, 17–26.
59. Camin, F.; Moschella, A.; Miselli, F.; Parisi, B.; Versini, G.; Ranalli, P.; Bagnaresi, P. Evaluation of the markers for the traceability of potato tuber grown in an organic and versus conventional regime. *J. Sci. Food Agric.* 2007, 87, 1330–1336.
60. Diviš, J.; Bárta, J.; Heřmanová, V. Nitrogenous substances in potato (*Solanum tuberosum* L.) tubers produced under organic and conventional crop management. In Proceedings of the 3rd QLIF Congress: Improving Sustainability in Organic and Low Input Food Production Systems, Stuttgart, Germany, 20–23 March 2007.
61. Brazinskiene, V.; Asakaviciute, R.; Miezieliene, A.; Alencikiene, G.; Ivanauskas, L.; Jakstas, V.; Viskelis, P.; Razukas, A. Effect of farming systems on the yield, quality parameters and sensory properties of conventionally and organically grown potato (*Solanum tuberosum* L.) tubers. *Food Chem.* 2014, 145, 903–909.

62. Keutgen, A.J.; Wszelaczynska, E.; Poberezny, J.; Przewodowska, A.; Przewodowski, W.; Milczarek, D.; Tatarowska, B.; Flis, B.; Keutgen, N. Antioxidant properties of potato tubers (*Solanum tuberosum* L.) as a consequence of genetic potential and growing conditions. *PLoS ONE* 2019, 14, e0222976.
63. Romero-Pérez, A.I.; Lamuela-Raventós, R.M.; Andrés-Lacueva, C.; De La Carmen Torre-Boronat, M. Method for the quantitative extraction of resveratrol and piceid isomers in grape berry skins. Effect of powdery mildew on the stilbene content. *J. Agric. Food Chem.* 2001, 49, 210–215.
64. Lachman, J.; Hanouz, K.; Šulc, M.; Orsák, M.; Pivec, V.; Hejtmánková, A.; Dvořák, P.; Čepelc, J. Cultivar differences of total anthocyanins and anthocyanidins in red and purple-fleshed potatoes and their relation to antioxidant activity. *Food Chem.* 2009, 114, 836–843.
65. Vaitkevičienė, N.; Kulaitienė, J.; Jarienė, E.; Levickienė, D.; Daniļčenko, H.; Średnicka-Tober, D.; Rembiałkowska, E.; Hallmann, E. Characterization of bioactive compounds in colored potato (*Solanum tuberosum* L.) cultivars grown with conventional, organic, and biodynamic methods. *Sustainability* 2020, 12, 2701.
66. Andre, C.M.; Oufir, M.; Guignard, C.; Homann, L.; Hausman, J.F.; Evers, D.; Larondelle, Y. Antioxidant profiling of native Andean potato tubers (*Solanum tuberosum* L.) reveals cultivars with high levels of β -carotene, α -tocopherol, chlorogenic acid and petanin. *J. Agric. Food Chem.* 2007, 55, 10839–10849.
67. Tierno, R.; Hornero-Méndez, D.; Gallardo-Guerrero, L.; López Pardo, R.; Ruiz de Galarreta, J.I. Effect of boiling on the total phenolic, anthocyanin and carotenoid concentrations of potato tubers from selected cultivars and introgressed breeding lines from native potato species. *J. Food Compos. Anal.* 2015, 41, 58–65.
68. Lombardo, S.; Pandino, G.; Mauromicale, G. The mineral profile in organically and conventionally grown early crop potato tubers. *Sci. Hortic.* 2014, 167, 169–173.
69. Warman, P.R.; Havard, K.A. Yield, vitamin and mineral contents of organically and conventionally grown potatoes and sweet corn. *Agric. Ecosyst. Environ.* 1998, 68, 207–216.
70. Asami, D.K.; Hong, Y.J.; Barret, D.M.; Mitchell, A.E. Comparison of the total phenolic and ascorbic acid content of freeze-dried and air-dried marionberry, strawberry, and corn grown using conventional, organic, and sustainable agricultural practices. *J. Agric. Food Chem.* 2003, 51, 1237–1241.
71. Wacholder, K.; Nehring, K. Über den Einfluß von Düngung und Boden auf den Vitamin C-Gehalt verschiedener Kartoffelsorten. 2. Mitt. *Bodenk Pflanz.* 1940, 16, 245–260.
72. Storkova-Turnerova, J.; Prugar, J. Ernährungsfysiologische Qualität von ökologisch und konventionell angebauten Kartoffelsorten in den Erntejahren 1994–1996. In *Deutsche Gesellschaft für Qualitätsforschung (Pflanzliche Lebensmittel)*; Schulz, H., Ed.; Vortragstagung: Dresden, Germany, 1998; Volume 33, pp. 209–215. (In German)
73. Asakaviciute, R.; Razukas, A. Potato (*Solanum tuberosum* L.) tubers sensory properties of different farming systems. *Int. J. Agric. Environ. Bioresearch* 2020, 5.
74. Sinden, S.L.; Deahl, K.L.; Aulenbach, B.B. Effect of glycoalkaloids and phenolics on potato flavor. *J. Food Sci.* 1976, 41, 520–523.