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Review

Bioenergy and Biopesticides Production in Serbia—Could Invasive Alien Species Contribute to Sustainability?

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Abstract: The critical role of energy in contemporary life and the environmental challenges associated with its production imply the need for research and exploration of its novel resources. The present review paper emphasizes the continuous exploitation of non-renewable energy sources, suggesting the transition toward renewable energy sources, termed 'green energy', as a crucial step for sustainable development. The research methodology involves a comprehensive review of articles, statistical data analysis, and examination of databases. The main focus is biomass, a valuable resource for bioenergy and biopesticide production, highlighting not only its traditional diverse sources, such as agricultural waste and industrial residues, but also non-edible invasive alien plant species. This study explores the utilization of invasive alien species in circular economy practices, considering their role in bioenergy and biopesticide production. The potential conflict between bioproduct acquisition and food sector competition is discussed, along with the need for a shift in approaching non-edible biomass sources. The paper emphasizes the untapped potential of under-explored biomass resources and the necessity for policy alignment and public awareness. Species with a significant potential for these sustainable strategies include *Acer negundo* L., *Ailanthus altisima* (Mill.) Swingle., *Amorpha fruticosa* L., *Elaengus angustifolia* L., *Falopia japonica* (Houtt.) Ronse Decr., *Hibiscus syriacus* L., *Koelreuteria paniculata* Laxm., *Paulownia tomentosa* Siebold and Zucc., *Partenocissus quenquefolia* (L.) Planch., *Rhus typhina* L., *Robinia pseudoacacia* L. and *Thuja orientalis* L. In conclusion, the paper highlights the intertwined relationship between energy, environmental sustainability, and circular economy principles, providing insights into Serbia's efforts and potential in adopting nature-based solutions for bioenergy and biopesticides acquisition.

Keywords: biofuels; biogas; biomass; biopesticides; biowaste; circular economy; invasive alien species; nature-based solutions; sustainable development goals; urban greenery

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1. Introduction

Energy represents a primary need of a contemporary man, enabling the normal functioning of all aspects of life. Since the dawn of human civilization, people have adapted to different environmental conditions through the utilization of available natural resources for energy production. The industrialization and urbanization processes, combined with the continuous population growth, strongly affect the sector of energy production, which is reflected in the increasing exploitation of non-renewable energy sources [1]. Excessive energy consumption has led to serious environmental issues, such as global warming and climate change, as a result of greenhouse gas emissions from fossil fuel combustion, further causing the deterioration of both the environment and biodiversity [2]. The intense need for carbon-based fossil fuels has prompted many countries around the world to establish short-, medium-, and long-term systems aimed at transitioning to the use of renewable energy sources [3]. To adequately approach the preservation of the environment and natural resources, new technologies need to be accepted, which implies the development of the innovative concept of "green energy" [4–6]. The Global Renewable Energy Community announced that the amount of energy produced from renewable energy sources worldwide, such as hydropower, geothermal energy, wind energy and especially bioenergy, records a positive trend [7]. In the future, it is expected that renewable energy will play an essential role in the world's energy supply, enabling the sustainable development of countries around the globe [8].

Biomass is a valuable source of raw material for the production of bioenergy, including biopower and biofuels [9]. Besides forests, agricultural plants, and newly introduced algaculture as a source of bioenergy, biomass encompasses different kinds of waste, such as biodegradable parts of by-products, waste or residues from agriculture (plant or animal origin), forestry and related industries, as well as biodegradable parts of industrial and municipal waste [3,10]. Unsustainable biowaste management practices are responsible for soil, groundwater and air pollution, with toxic compounds released into the environment, posing a serious threat to human health through the biological food chain [11]. Along with the energy-related environmental challenges, pesticides' utilization in food production and plant breeding in general endangers sustainable development, jeopardizing environment preservation and human health improvement strategies. Biomass, except for its usage in bioenergy production, also offers numerous possibilities as a source of biopesticides. Biopesticides are pesticides of biological origin, developed from naturally occurring living organisms, mostly microorganisms (e.g., bacteria, fungi, and baciloviruses), animals (entomopathogenic nematodes), and plants. Biopesticides are alternatives to synthetic chemical pesticides and are key components of integrated pest management systems [12,13]. Biopesticides have several advantages over their synthetic chemical predecessors: they are usually less harmful, target-specific, effective in small quantities, decompose quickly, do not leave harmful residues in the environment and the development of resistance is less. To be accepted by producers, biopesticides must be as effective as the synthetic chemical pesticides they would replace [12].

The need for energy security paired with environmental degradation are the main issues associated with a linear economy based on conventional non-renewable energy sources [14–17]. The circular economy, unlike the linear economy, represents a sustainable economic system in which economic growth is related to the reduced utilization of non-renewable resources [18].

The acquisition of bioproducts may be competitive with the food sector if food commodities are used as feedstock for bioenergy and biopesticides, or if the crops needed for production are cultivated on soil suitable for agricultural activities [19]. An additional problem that could arise from the increased bioproduct acquisition is the reduction of water availability for food production, as a larger amount of water is directed toward the manufacturing of bioproduct feedstock [20,21]. To address those essential questions while enabling the achievement of sustainable development goals set by Agenda 2030 [22], the approach to non-edible biomass sources as feedstock for bioenergy and biopesticide production must be altered [23].

The Republic of Serbia, a country situated in south-eastern Europe, does not fully utilize the possibilities regarding sustainable biomass usage due to many restraints. As candidates for joining the European Union, Serbia and other Balkan countries, have accepted the obligation to follow EU policies and programs, which implies that these countries need to introduce and intensify the production and use of renewable energy sources by 2030 [22,24]. The National Strategy for the Sustainable Use of Natural Resources and Goods highlights the main issues concerning the production and use of renewable energy, including the insufficient availability of technology, a lack of knowledge and professional skills to use necessary technologies, the undeveloped biomass market, the need for the introduction of measures for the purpose of biomass production monitoring, and the non-compliance of policies between the energy sector and other related sectors [25]. Although suitable for the production of bioproducts, in terms of feedstock availability [26], Serbia is not equipped with sufficiently developed capacities to achieve its full potential concerning nature-based solutions in this field. The low level of public awareness about the benefits related to renewable energy, a lack of financial resources and the absence of a legal framework, make it difficult for Serbia to properly approach the issues of sustainable development [27,28]. This paper provides insight into the current status of bioenergy and biopesticide production in Serbia, evaluating the progress in this sector concerning the progress of the neighboring countries and the general development of renewables in the world.

Rural and urban ecosystems represent an inexhaustible source of biomass needed for the implementation of nature-based green solutions. In addition, the green infrastructure including different types of green spaces—from small domestic gardens to great urban parks and forests—plays a significant role in the invasion of ornamental allochthonous species that represent "hotspots" of the spread and adaptation of invasive alien species (IAS) to different environmental conditions [29]. By the utilization of biowaste produced by IAS, the eradication of such species could be omitted, without compromising biodiversity preservation [30]. This study further questions the potential of IAS utilization in the context of a circular economy, exploring their suitability for the production of bioenergy and biopesticides.

2. Research Methodology

This review encompasses articles available in Scopus and Scholar databases. The statistical data were analyzed and gathered through the investigation of official databases such as the Statistical Office of the Republic of Serbia, the statistical office of the European Union (Eurostat) and International Energy Agency (IEA). The research was conducted by using of the following search strings: 'bioenergy', 'biowaste', 'biomass', 'biofuels', 'biodiesel', 'bioethanol', 'biogas', 'biopesticides', 'circular economy', 'invasive alien species', 'sustainable development', 'urban areas', etc. Research articles, review papers, books and conference papers written in English and Serbian were examined.

3. Biowaste in the Context of Sustainable Development, Circular Economy and Invasive Alien Species Utilization

In 2015, the United Nations member states endorsed the '2030 Agenda for Sustainable Development', with the goal of promoting advancements in health and education, alleviating poverty, fostering economic growth, mitigating climate change, and conserving the environment and its natural resources [31,32]. The seventeen Sustainable Development Goals (SDGs) were constituted to create a common vision and concept towards a sustainable world, and their adoption can help many cities to achieve their goals and strategies through sustainable practices that are based on nature solutions [33]. In this Agenda, waste management is considered a crucial element in making inclusive, safe, resilient and sustainable cities and human settlements (SDG 11) and ensuring a sustainable production and consumption patterns (SDG 12) [22]. These objectives entail minimizing adverse effects on air, water, and soil quality through environmentally responsible waste management practices. They also involve decreasing food losses throughout production and supply chains, along with waste reduction achieved through prevention, reduction, recycling, and reuse strategies. In that context, biowaste could provide the feedstock for energy production, securing affordable, dependable, and contemporary energy access, while boosting the proportion of renewable energy within the global energy blend (SDG 7) [31,32]. On the other hand, the production of biopesticides from biowaste enables improvements in the promotion of sustainable agriculture and the implementation of resilient agricultural practices (SDG 2). Such environmentally sound waste utilization affects greatly the accomplishment of many goals leading to sustainability, including food security achievement (SDG 2), good health and well-being (SDG 3), gender equality (SDG 5), water availability (SDG 6), sustainable economic growth and work opportunities (SDG 8), industry, innovation and infrastructure improvements (SDG 9), sustainable cities and communities (SDG 11) and climate change mitigation (SDG 13), as well as the prevention of biodiversity loss and preservation of ecosystems (SDG 15) [32,34].

The biowaste utilization in the acquisition of bioproducts supports the concept of circular economy, by increasing the reuse of natural resources and the reduction of non-renewable resources exploitation, concurrently increasing the economic benefits [35,36]. The circular economy represents a strategy of sustainable development based on three principles: (1) sustainable amount of raw materials; (2) sustainable processes of production and/or consumption of products; (3) circular flow of matter (a closed loop system) [37]. A closed-loop system in which green feedstock is transformed into value-added product streams that are further used as a starting point for the production of new sustainable technologies, increases the amount of energy, as well as economic and environmental benefits [38,39]. Thus, sustainable development through the circular economy is based on reduce, reuse, recycle, recover and return [40]. Such an approach represents a departure from the linear economic model, characterized with the take–make–consume–throw consumption pattern [28]. In March 2022, the European Commission unveiled the initial set of initiatives aimed at facilitating the shift from a linear to a circular economic model. These measures are designed to foster the development of sustainable products and enhance public awareness of the green transition [41].

The city's green infrastructure, comprising parks, urban green spaces, street plantings, courtyards, squares, and residential complexes, boasts a diverse array of native and introduced ornamental plant species. Biowaste collected from these areas represents potential green feedstock for the bioproducts utilization—biomass for heating, liquid biofuels, biogas and biopesticides, offering a number of sustainable green solutions based on nature [29]. One of the biggest challenges of circular economy is to systematize by-products from nature (stems, leaves, husks, barks, seeds, fruits and other bio-waste that can be found in public areas) using integrated processes that enable sustainable management of biowaste while creating raw materials with high functional value for energy application [42]. The production of eco-friendly products from ornamental dendroflora through sustainable practices, green technology and nature-based solutions tends to promote the development of the circular economy concept that will have a positive impact on the environment and biodiversity [43,44]. In a review, Ljubojević et al. [32] presented the innovative approach of 'greening the economy and economizing the greenery,' which proposes the utilization rather than eradication of ornamental IAS that are rich in oil, adding a new ecosystem service to species otherwise considered detrimental for the growth of non-invasive species found in the same environment. The selection criteria for optimal feedstock imply factors such as lipid content, growth characteristics, and geographical adaptability, while the objective of proper species' selection is not restricted to the identification of high-yielding individuals only, but also needs to be in line with sustainable and economically viable production practices.

4. Current Status and Potential for Bioenergy and Biopesticides Production in Serbia

4.1. Biomass, Liquid Biofuels and Biogas

Bioenergy represents the largest renewable source of energy, based on several feedstock types. Mostly exploited feedstock includes residues from forestry (fuelwood, wood chips, sawdust), crops cultivated specifically for the purpose of energy production, wastes and agricultural residues (animal waste, paddy straw, rice husk), as well as some municipal solid waste partitions [45]. The overall energy demand records continuous growth, with a growth rate of 4% in 2021 in comparison with the pre-pandemic period, where modern renewables counted 8.8% in 2011, 11.7% in 2019 and 12.6% in 2021 of total energy consumption [46]. When compared to fossil fuels' utilization of around 80% in overall consumption, renewables were responsible for the significantly lower share of energy, but the positive trend showed valuable improvement in renewable energy production. From the total share of renewable energy utilization, the same source reported that biofuels for transport participated with 1%, while biomass joined with the geothermal, ocean, solar and wind power participated with only 3%. In 2022, the biomass feedstock provided 2.4% of the overall generation of electricity [47].

The highest amount of the renewable energy produced in Serbia in the period 2017–2021 was utilized in the sectors of electricity and the sector of heating and cooling, while the sector of transport used less than 2% of renewable energy (Table 1) [48]. In the selected five-year period, the average renewable energy share in total energy consumption was 22.73%. From the total amount of energy used for heating and cooling purposes in 2021, 35.47% belonged to renewables.

Table 1. Share of renewable energy in gross final energy consumption in Serbia in period 2017–2021 (in %) [48].

Year	Total	Sector of Electricity	Sector of Transport	Sector of Heating and Cooling
2017	20.29	27.45	1.21	24.90
2018	20.32	28.66	1.18	24.29
2019	21.44	30.11	1.14	26.65
2020	26.30	30.70	1.17	35.68
2021	25.28	29.90	0.62	35.47

The bioproducts acquisition from biomass is not a new process, but its use and application represent a major challenge for developing countries [49]. The increasing import of fossil fuels and the increasing demand for non-renewable energy sources in Serbia are considered the key reasons why it is necessary to invest in the development of renewable energy sources as well as in procedures for biowaste management [50]. The energy sector in Serbia is considered one of the most important and largest sectors of the country's economy, but also very inefficient, as it is largely dependent on oil imports as its reserves of non-renewable energy sources are very limited [51]. Serbia's energy dependency stands at 40%, which is deemed average when compared to other EU nations [52].

Biomass can be produced from edible and non-edible raw materials from the natural environment. In Serbia, agricultural edible crops such as sunflower, flax, soy and other crops are mainly used. Taking into account the factor of feedstock competition with food sector, non-conventional and non-edible oils have an advantage over edible oils when it comes to the production of bioenergy, and at the same time, they should represent a feedstock that has a high energy value [53].

In the total amount of primary energy production in Serbia in 2020, the energy produced from biomass—firewood, wood chips and residue, participated with 14.83% (67,334 TJ) [54]. With that share of production, the biomass derived bioenergy followed the coal based energy production which participated with 65.11%. The bioenergy production in the form of biogas counted 1624 TJ, i.e., only 0.36%. In the same year, wood fuels accounted for 65,359 TJ (16.4%) in total energy available for the final consumption [54]. Such low share of biomass sourced bioenergy is by no means an indicator of the real potential of biomass since the availability of biomass for the purpose of energy production is very high at the whole territory of the country. In 2021, the highest production of energy from biomass in Serbia was obtained from firewood—64,506 TJ, while significant amount of 2432 TJ was produced from wood residuals and wood chips (Table 2). The import of wood pellets was the highest, while country imported and exported almost equal amounts of energy from wood fuels. The energy from firewood and wood pellets was mostly used for households' consumption needs, followed by industry sector. The level of use of forest biomass is relatively high, with 66.7% of biomass utilized, in contrary to the utilization of biomass from agriculture—about 2% and the use of biodegradable municipal waste, which is not integrated into the sustainable practices at all and which potential is irreversibly lost [55]. The forest resources, as a valuable biomass source, in Serbia in 2020 counted over 2 million ha, from which the largest potential lies in southern and eastern part of Serbia (1,072,271 ha), followed with the Šumadija region and Western Serbia (988,494 ha) [54]. On the other hand, the agricultural biomass is mostly located in Vojvodina, i.e., northern part of Serbia [55]. To provide an increase in the agricultural biomass potential (especially residues from plant, fruit and grape production), it is important to enable cultivation of energy crops that will not jeopardize production of food crops. That means that such energy crops should be cultivated at limited suitable or degraded land, abundant in the central part of Serbia [56]. Because of the high rate of population transition from rural to urban areas, the area of unused agricultural land is expected to increase, opening the possibility for the increase in energy crop cultivation [57]. Plants most commonly used as energy crops are wild or cultivated perennial grass family species, characterized by the production of large amounts of aboveground biomass and minimal energy inputs for cultivation and utilization [58,59].

Table 2. Balance of wood fuels in 2021, according to the Statistical Office of the Republic of Serbia [60].

	Wood Fuels (Including Charcoal) *	Firewood	Wood Residual and Wood Chips	Wood Briquettes	Wood Pellets	Charcoal
Primary production	66,938	64,506	2432	-	-	-
Import	1761	118	-	82	1506	55
Export	1664	243	-	119	1024	278
Gross available energy	68,999	65,655	2744	−42	854	−212
Final energy consumption	68,003	61,343	-	568	6073	19
Industry **	7282	5148	-	360	1756	18
Households	59,793	55,728	-	166	3899	0
Agriculture	80	40	-	-	40	-
Other users	848	427	-	42	378	1

* In Terjoules (TJ). ** Industry, excluding energy sector.

Local governments and urban communities face mounting pressures to manage, collect, process, and dispose of waste appropriately in Serbian cities struggling to manage the effects of uncontrolled urbanization [52]. Because of that, biodegradable waste as a biomass source remains unutilized, despite its potential in bioenergy production. Although Serbia has been in the process of joining the European Union for decades, developing an effective biowaste management system is essential, aligning with the broader societal and economic progress and in accordance with the European Union's renewable energy agenda [52]. Today, the most common policy of waste management in Serbia is disposal in landfills or on free-untouched surfaces, which represents a huge danger to the environment in the form of gas emissions, CO_2 and CH_4 leakage and the production of wastewater. It is necessary to change this technology through sustainable practices to encourage development and reduce the harmful impact on the environment [61].

The development of biofuels markets, investment rates and the construction of new facilities is strongly affected by different factors, including policy uncertainty, competition for feedstock, crop productivity dependence on the weather conditions, competition of biofuels production with food production in terms of land and water resources, concerns about production impacts on environment [62]. The production of liquid biofuels in the world was 162 billion liters in 2021, which corresponds to 3.6% of total energy consumption in the transport sector [47].

Biodiesel derived from biomass sources stands out as a promising alternative to petroleum diesel fuel. It represents a biodegradable, non-toxic, nearly sulfur-free, and non-aromatic fuel, originating from vegetable oils or animal fats [63]. Globally, biodiesel has been gaining growing attention, serving either as a blending component or as a direct substitute for conventional diesel fuel in vehicle engines [64]. Feedstock materials utilized in biodiesel production encompass various triglyceride-based substances, traditionally categorized into the following main groups: vegetable oils (including both edible and non-edible types), animal fats (such as chicken fat, pork lard, beef tallow, and poultry fat), waste oils (such as waste cooking oils or waste industrial oils), and algal oils [63].

The limited adoption of biodiesel as a replacement for fossil diesel is mainly attributed to its relatively higher production costs and the restricted availability of feedstock [65]. In Serbia, sunflower, rapeseed and soybean are recognized as the most significant oilseed crops. According to Đurišić-Mladenović et al. [63], if sunflower and/or rapeseed, along with waste cooking oils, are going to be the main sources of biodiesel production in Serbia, the annual biodiesel output has the potential to reach approximately 285,000 tons. This quantity would replace nearly 20% of the diesel fuel consumed in the transportation sector in Serbia. Alternatively, if soybean oil is considered the primary biodiesel feedstock, the substitution rate would be 10%.

The contribution of oilseed crops to the total biodiesel production potential in Serbia is substantial, ranging from 88% to 93% [63]. The utilization of edible oils poses a challenge to global food production, which is further exacerbated by fertile soil scarcity. Therefore, there is a pressing need to explore biodiesel production from non-edible or lower-quality edible oils derived from existing urban and peri-urban greenery. Investigating these alternative sources could help address the conflict between biodiesel production and the demands of fertile soils for food production [53]. A segment of agricultural waste biomass and used frying oil is identified as highly appropriate feedstock for biodiesel production, offering advantages from both environmental and economic standpoints. By utilizing these materials as feedstock, not only is the problem of waste disposal addressed, but it also reduces the demand for agricultural feedstock that could otherwise be utilized for food production [66]. Recent studies by domestic researchers discussed some novel feedstock alternatives that could be introduced in Serbia for the purpose of bioenergy production, suggesting the non-edible species that are relatively easy to grow, that are characterized with intensive annual vegetative biomass growth, which production is more cost-effective or that are suitable even for degraded soils [67,68]. The potential of the following species have been discussed: *Phragmites australis*, *Miscanthus* × *giganteus*, *Beta vulgaris* L., *Saccharum* sp., *Ricinus communis* L. *Prosopis* sp., *Arundo donax* L., *Thinopyrum ponticum*, *Panicum virgatum* [68–70]. Current legislatives in Serbia do not recognize specifically the IAS as a source of biomass for liquid biofuels nor biogas production thus such feedstock could be assigned to the residuals from forestry or horticulture and biodegradable part of municipal waste. However, the potential of many IAS for bioenergy acquisition has been investigated and recognized by researchers in Serbia and worldwide, including species *Koelreuteria paniculata* [53,71], *Reynoutria japonica* [72], *Ailanthus altissima* [73], *Paulownia tomentosa* [74], *Dichrostachys cinerea* [75], *Acacia Holosericea* [76], etc. The process of biodiesel acquisition from invasive species in Serbia has been investigated and explained in the works of Ljubojević et al. [30] and Tomić et al. [53].

The fact that diesel vehicles will be banned in many European cities in the near future, decreased prices of used vehicles, which enabled citizens of Serbia to buy those cheaper vehicles, further increasing already high consumption of diesel fuel for transportation purposes. To address the negative environmental impacts of this trend, and decrease foreign trade deficit, Serbia has to find sustainable ways of imports' reduction, highlighting the need for domestic production of biofuels [77]. The directive 2009/28/EC set a goal to achieve 10% of biofuels in petroleum fuels by the end of 2020. A previous directive implied 5.75% share of biofuels, including biodiesel and bioethanol, in total transport fuels, by the end of 2010. This goal has led to several important investments in production of biodiesel in Serbia, where investors indeed believed that state will provide incentives and aid to overcome obstacles in production [77,78].

After the initial installation of biodiesel plants in Serbia, several government moves led to almost complete termination of production, including high excise taxes on biofuels, the absence of subsidies for production and transportation fuel marking regulations [66,78]. Central Serbia currently has a modest share of approximately 2% of oil crops out of its total arable land area. This implies that a significant expansion in the cultivation of oil crops is more likely to occur in Central Serbia rather than in Vojvodina, where the cultivation potential has already been realized [77]. The country encompasses around 4.2 million hectares of cultivable land, with an annual portion ranging from 170,000 to 200,000 hectares left unused [79]. It was estimated that within a span of five to seven years, it is possible to produce enough feedstock for the production of 300,000 tons of biodiesel, utilizing 200,000 hectares of available land [79–81]. The balance of biodiesel production and consumption in Serbia appears for the first time in 2021 in the data of the Statistical Office of the Republic of Serbia [60]. The import of biodiesel in its pure form counted 1139 t, while 758 t of biodiesel fraction in blended biodiesel (biodiesel blended with fossil fuel) were exported, with no primary production of this form of biodiesel. Gross available energy of pure biodiesel was 28 TJ, but this biofuel was not utilized.

Although Serbia has basic prerequisites for the production of bioethanol, the level of industrial bioethanol production is very low. Bioethanol is mostly used for medical and pharmaceutical purposes, as well as in the production of alcoholic beverages [82]. Serbia is not producing bioethanol as an energy source and in order to provide capacities for the production of bioethanol as a fuel, new capacities need to be constructed [24,83].

According to the Energy Development Strategy of the Republic of Serbia, the raw materials required for bioethanol production include cereals, millet, Jerusalem artichoke (topinambour), and potatoes [55]. The primary source for bioethanol production is sugar beet molasses [84], but maize is presently the most appropriate as bioethanol feedstock in Serbia [83].

An estimate suggests that roughly 100,000 hectares of marginal land in the Republic of Serbia could be utilized for the cultivation of millet and Jerusalem artichoke, potentially leading to the production of around 3 million tons of ethanol per year [55]. The utilization of field crops for biodiesel and bioethanol production has been consistently increasing until recently. Particularly noteworthy for cultivation, given their substantial energy potential, are prairie grass, reed canary grass, giant reed, and miscanthus [85]. Alternative feedstocks not suitable for the food production are actively being sought [86].

Biogas is an another efficient renewable energy source that contributes to the reduction of greenhouse gas emissions and aids in waste disposal [87]. Reducing the release of greenhouse gases into the atmosphere involves preventing methane emissions that occur naturally during the storage of substrates. Biogas is primarily composed of methane (CH_4) within the range of 50–70%, along with carbon dioxide (CO_2) at a concentration of 30–50% [88]. It is predominantly utilized for the generation of heat and electricity. When upgraded to pure biomethane, it is employed as a vehicle fuel, serving as an alternative to fossil fuels [89]. As a renewable energy source, biogas holds advantages over solar and wind energy due to its constant (and variable) energy generation and the potential for energy storage in the form of biomethane [87].

Biogas can be produced in different facilities like landfills, sewage treatment plants, or anaerobic digestion plants. The characteristics of biogas, such as its chemical composition, energy potential, and fuel properties, vary depending on where it originates [89]. Various feedstocks can be utilized for biogas production, including agricultural products (such as energy crops) and by-products (like livestock manure and crop residues), industrial wastes and residues, municipal organic waste, among others [87,90].

The biogas sector exhibits considerable diversity across Europe, with well-developed systems in countries such as Germany, Denmark, Austria, and Sweden, followed by the Netherlands, France, Spain, Italy, the UK, and Belgium [91,92]. The study conducted by Cvetković et al. [93], showed that Serbia has a great potential for biogas production. There are 24 registered biogas power plants that commenced operations between 2011 and 2021, boasting a combined installed capacity of 9415 kW [94]. The construction of 73 more biogas power plants is planned. The Energy Development Strategy until 2025 including projections up to 2030, foresees the construction of power plants with a cumulative capacity of up to 80 MW by the year 2030 [95]. The direct production of biogas from energy crops grown in agriculture presents the greatest potential for biogas production in Serbia. However, the official data on the raw material composition used in Serbian biogas power plants are currently unavailable [94]. Given that natural gas consumption in Serbia amounts to 2.5 billion m^3, these findings suggest a considerable opportunity for substituting natural gas. The estimated potential of biogas production from municipal solid waste in Serbia is 95.6 million m^3 per year, equivalent to 49.72 ktoe, indicating that municipal solid waste could become a significant energy source for the Republic of Serbia [93]. Djatkov et al. [96], argue that the utilization of municipal biodegradable waste as a substrate for biogas production will only become viable if there is a primary waste selection process in place.

According to Eurostat [97], the renewable energy share in total amount of energy, among Serbia and the neighboring countries differ significantly (Figure 1). Generally, the highest share in five-year period was recorded in Albania, Montenegro and Bosnia and Herzegovina. In 2022, the countries which participated with the share of energy from renewable resources around 40% were Albania and Montenegro, while share in Serbia reached more than 25%. Interestingly, Serbia showed higher or similar rates of renewable energy production, depending on the year, when compared with Slovenia, while these differences are even more prominent in comparison with Hungary. Such data indicate that the development of a country does not have to be directly correlated with the application of sustainable forms of energy.

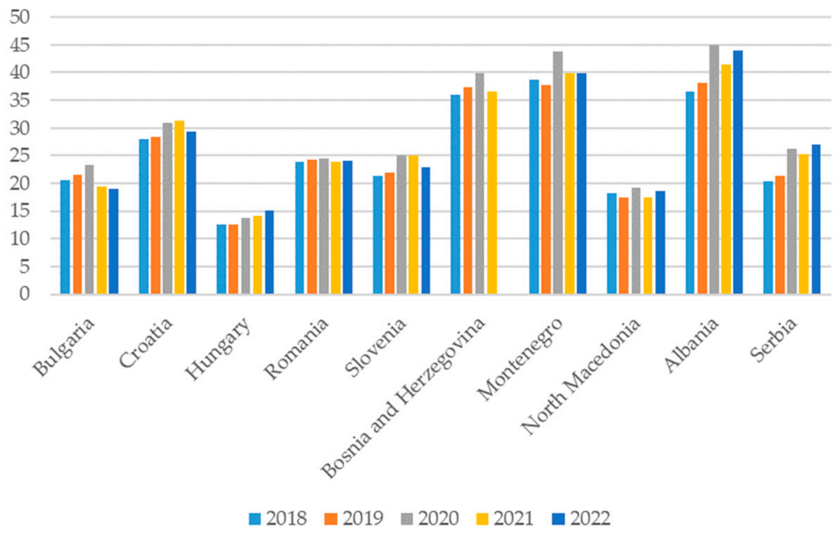

Figure 1. Share of energy from renewable sources (%) in Serbia and the neighboring countries of Western Balkan in a five-year period [97].

Figure 2 shows that in Serbia, the complete renewable energy available was near 3 million toe, which represent about half of the estimated total renewable energy potential of 5.65 million toe per year [55]. Among the selected neighboring countries of Serbia, Romania was characterized with the highest amount of energy from renewables in the five-year period, reaching about 6.5 million toe in 2021. Figure 3 shows complete energy balances (non-renewable plus renewable energy) per country in 2017–2021, showing the ratio between total and renewable energy in one year. In Table 3, the share of renewable fuels in total gross final consumption in 2021 is shown. From total energy produced, Serbia produced 25.58% renewable energy, being placed behind Albania, Montenegro, Bosnia and Herzegovina, and Croatia, which reached share higher than 30%. The National Renewable Energy Action Plan for the Republic of Serbia established a target to achieve a share of 27% of energy produced from renewable sources in relation to the total gross final energy consumed by 2020 [98]. Despite the numerous ambitious projections that Serbia would accomplish the planned goal, the target share was not achieved. In 2021, the share of renewable energy in total consumption was even lower than in 2020, after which the highest share was recorded in 2022 [97,99]. Bearing in mind that Serbia is aiming to further increase the share of renewable energy sources in the future, the goal is to provide more feedstock and develop capacities for the increased production [28].

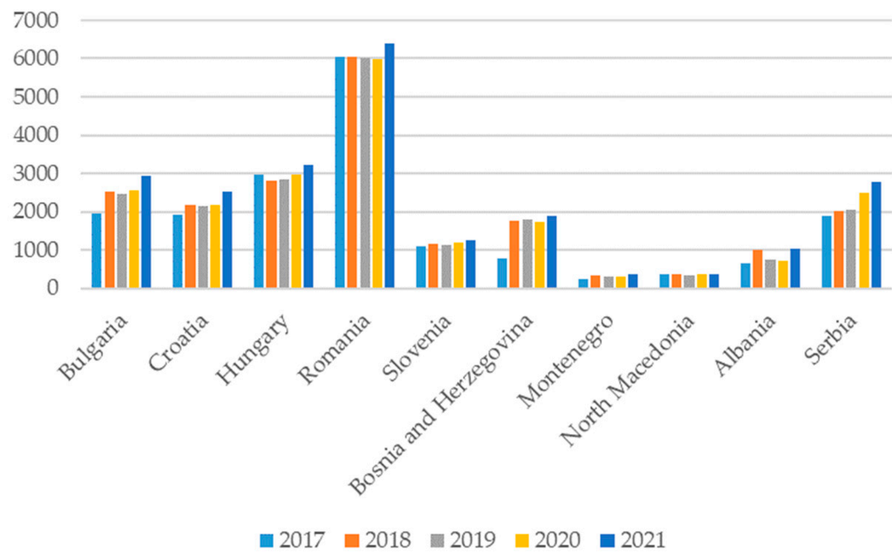

Figure 2. Complete energy balances of Renewables and biofuels per country in 2017–2021 (in thousand tons of oil equivalent of gross available energy) according to Eurostat [97].

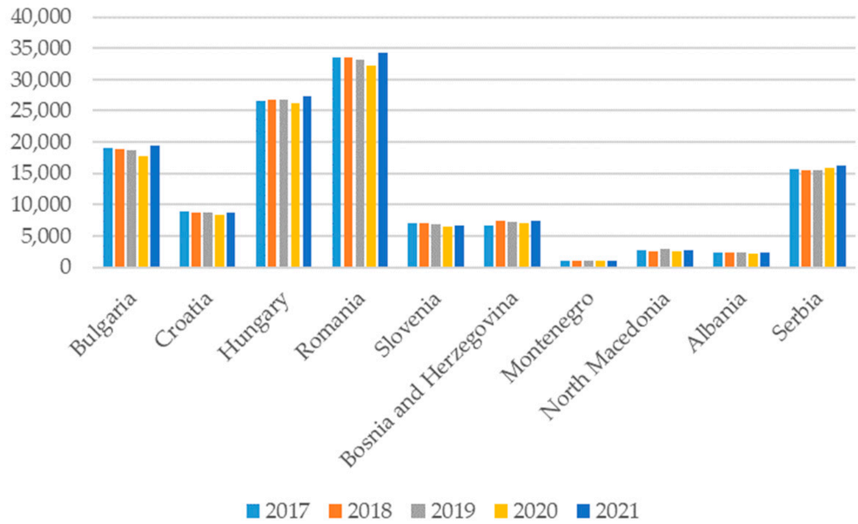

Figure 3. Complete energy balances per country in 2017–2021 (in thousand tons of oil equivalent of gross available energy) according to Eurostat [97].

Table 3. Share of renewable fuels in total gross final consumption of energy in 2021, per country [97].

Country	Share of Renewable Fuels (%)
Bulgaria	16.99
Croatia	31.32
Hungary	14.09
Romania	23.85
Slovenia	25.00
Bosnia and Herzegovina	36.56
Montenegro	39.89
North Macedonia	17.29
Albania	41.39
Serbia	25.28

In 2018, the EU set a challenging goal of achieving a 32% share of renewable energy in the total energy consumption of its member states by 2030. The directive (EU) 2018/2001 of the European Parliament and of the Council brought regulations established to abolish barriers, incentivize investments, and promote cost reductions in production of renewable energy, which will enable citizens, consumers, and businesses to take part in transitioning their personal consumption towards clean energy alternatives. In 2021, the European Commission proposed an increase in this percentage to 40%, and then in 2022, it put forward a proposal for the share of renewable energy sources in the energy mix to be raised to even 45% [100]. Securing multiple permits and licenses from both local and national authorities is essential for implementing projects that utilize renewable energy sources. The intricate nature of this process acts as a deterrent to making more significant investments in this sector. This issue is commonly noted in reports by the European Commission, identified as a significant barrier to meeting quotas for specific renewable energy sources more quickly [101]. It could be tackled by actively involving potential producers of biomass, educating them about diverse possibilities and benefits, and adopting a unique approach to assessing biomass in contrast to other sources of renewable energy. In March 2021, the Government of the Republic of Serbia submitted a proposal for a set of energy laws to the National Assembly for adoption. One of these is the recently implemented Law on the Use of Renewable Energy Sources, which became effective in April 2021. Through the implementation of this legislation, the Republic of Serbia officially recognizes the importance of utilizing renewable energy sources in energy production as one of its top priorities. The law delineates several incentive measures designed to attract investments in this field [99,102].

4.2. Biopesticides

Biopesticides have emerged as a green tool in the era of sustainable agriculture and as suitable for the production of 'organically produced food' and 'biologically based products' [103]. Plants have developed many strategies to defend themselves from being assaulted by predators by developing compounds that are highly toxic to pests and/or phytopathogens [13]. Botanicals are biopesticides derived from different plant tissues or organs and can be used in different ways, mostly like different kind of extracts or essential oils. Some botanicals are highly effective against pest insects [104,105], plant pathogens [106,107] or other plants [107,108].

Currently, 68 biopesticide active substances are registered in the EU, while over 1000 biopesticide-based products are imported worldwide [109,110]. The development of biopesticides was recognized and defined by EU regulation (2009/128/EC) with the goal of promoting sustainable agriculture and mitigating the adverse effects of synthetic chemical pesticides on the environmental and human health [111]. However, only a few member countries have recognized biopesticides as a separate group of alternative pesticides, which has led to their reduced use due to a lack of awareness of their importance, effectiveness and environmental safety [112].

According to the official data, a total of 1215 plant protection products were registered on the market in Serbia in 2023, of which a total of 1.31% are biopesticides (biofungicides 0.74%, bioinsecticides 0.33%, bioacaricides 0, 16% and other products based on biological substances 0.08%) [113]. Biopesticides occupy a small share with 16 registered products in the total market for plant protection in Serbia. In Serbia, the largest number of products based on biofungicides were registered in 2023, followed by bioinsecticides and bioacaricides, while no bioherbicides have yet been imported. The agricultural strategy in the Republic of Serbia still largely relies on the use of chemical selective pesticides [114]. Data from research conducted by Vlajkov et al. [115] show that in the period from 2015 to 2020, biopesticides participated with only 1.3% of the total market, and that the largest amount of imported biopesticides was related to bioinsecticides, followed by biofungicides and bioacaricides, which does not represent a significant difference compared to the previous results in 2023. Based on the previous research, it could be noticed that the market of biopesticides on the territory of Serbia is not yet sufficiently developed, therefore there is a need for novel research that will raise public awareness that biopesticides represent renewable resources with added value and a sustainable strategy for reducing the harmful effects of pesticides and ecological acceptability [116–118]. Despite biopesticides not having reached the same level of utilization as chemical pesticides, enhancing their efficacy and stability through the development of new active ingredients and advanced formulations is imperative [119].

The most commonly used biopesticides on the territory of Serbia, which are used as plant protection agents to combat invasive disease agents, are mainly microbiological and biochemical in nature. The utilization of these biopesticides is in accordance with the Law on Organic Agriculture. In their research, Golijan-Pantović and Sečanski [120] showed that biopesticides with microbiological effects containing bacteria such as *Bacillus subtilis* and *Bacillus thuringiensis* have great effectiveness in protecting and suppression of disease agents and pests. The bacterium *B. subtilis* has found the most effective when applied in biological protection and has the power to indirectly inhibit the growth and development of parasites. The bacterium *B. thuringiensis* is predominantly used in the control of harmful insects, having a great potential to control a wide range of pests, while it produces toxins that are harmless to humans and plants [119]. Some scientific papers note that 75% of biopesticides contain the Gram-positive bacterium *B. thuringiensis* in their composition [121]. The current status of biopesticides in Serbia is shown by biochemical research of biological pesticides containing plant extracts and essential oils. In their work on alternative sources of biopesticides, Šunjka and Mechora [119] stated that the application of essential oils can have a negative effect on plants if applied in high concentrations, although insecticides based on essential oils are less effective when applied in low concentrations. They also highlighted that plant extracts that have found application in the production of biopesticides offer an unlimited source of biodegradable, ecological and renewable resources as an innovative measure in the control of a large number of pests and diseases. In their work, Tanović et al. [122] demonstrated that 16 varieties of essential oils exhibited partial or complete inhibition of pathogenic mycelia growth under in vitro conditions. In research conducted by Golijan-Pantović and Sečanski [120], rosemary, pine, and orange essential oils exhibited the least potent effect, while basil, thyme, cinnamon, anise, geranium, and mint essential oils completely inhibited pathogen growth. The remaining essential oils demonstrated a reduction in fungal growth and development. Many studies suggest that in the coming years, the importance of biopesticides in agricultural practice will be equal to chemical pesticides and will become a dominant strategy for controlling and suppressing a large number of pests and diseases both in Serbia and around the world.

5. Invasive Alien Species in the Urban Environment—The Allies of the Cities' Sustainable Development

The Sofia Declaration on the Green Agenda for the Western Balkans, adopted by the EU and Western Balkan countries in 2020, supports the sustainable development and regional cooperation of Western Balkan countries [123]. This document emphasizes the need to address serious environmental challenges, focusing on six key areas, including the promotion of sustainable energy and the biodiversity protection [28]. The need for protection and restoration of the rich biodiversity of the Western Balkans is particularly highlighted. The occurrence of biological invasions due to the intentional and/or unintentional introduction of ornamental allochthonous species represents a global threat to natural resources and biodiversity [124–126]. Ornamental IAS are defined as allochthonous species that threaten urban ecosystems, degrade habitats and suppress autochthonous populations [127], leading to the serious changes in biodiversity and whole environment [128]. Introduced (exotic or allochthonous) species tend to overcome certain barriers to naturalize and create localized self-sustaining populations, after which they rapidly spread before being characterized as IAS [129,130]. Typically, naturalized IAS lack a documented introduction history. Additionally, predicting their spread speed and impact on urban green area biodiversity across cities proves challenging due to their high adaptability and ease of distribution between different regions [29,131]. The majority of IAS are introduced into various regions as ornamental horticultural plants, typically through channels such as garden centers, botanical gardens, nurseries, or the exchange of plant material [30,132]. Due to their adaptability, rapid growth, and aesthetic appeal, IAS have gained popularity not only in public green spaces as part of urban infrastructure but also in private gardens. Beyond their distinctive decorative features and quick development, these species often exhibit large flowers and produce a substantial quantity of fruits and seeds in their crowns. The green biomass of these ornamental species is readily available in abundance throughout the year and can be stored for extended periods.

Every year, a considerable amount of green biomass, including leaves, fruits, seeds, and twigs, is permanently lost in public green spaces [29]. The collection of green biomass from ornamental IAS, particularly those rich in oil, contributes to the advancement of nature-based green solutions. This approach facilitates the decrease in the spread and deposition of seeds and fruits in the soil, thereby reducing the level of invasiveness. Simultaneously, the harvested fruits and seeds can be utilized as feedstock for the acquisition of bioproducts (Figure 4). The green feedstock obtained from IAS has great potential for the production of alternative sources of bioenergy and biopesticides, as a source of essential oils that play a significant role in the pharmaceutical and cosmetic industry, or alternative feedstock in the fiber industry [53,133–135]. Such sustainable exploitation of raw materials from nature does not endanger the urban ecosystem functioning [29,30].

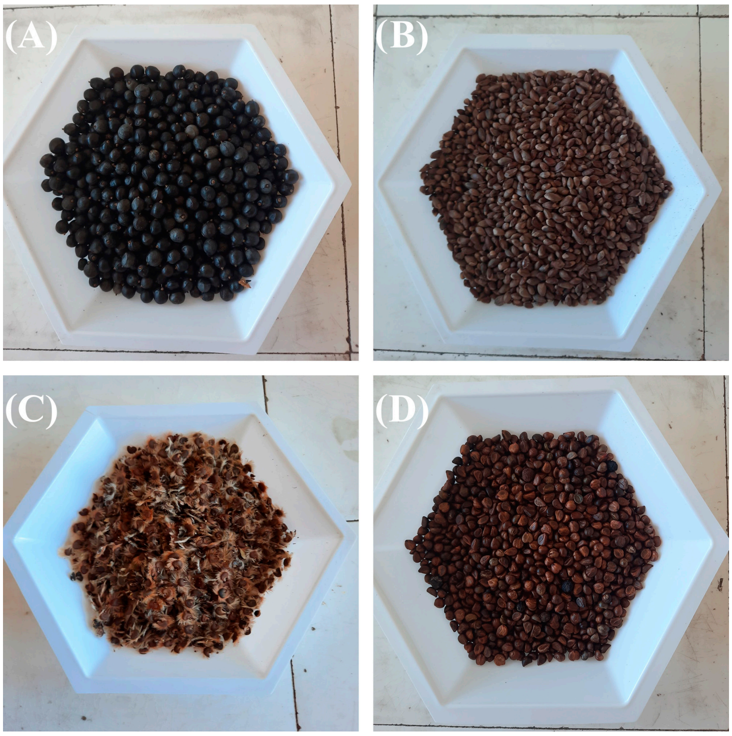

Figure 4. Green feedstock of invasive alien species (**A**) *Koelreuteria paniculata* Laxm.; (**B**) *Thuja orientalis* L.; (**C**) *Hibiscus syriacus* L.; (**D**) *Partenocissus quinquefolia* L.

According to Boršić et al. [136], IAS produce large quantities of reproductive progeny that occur spontaneously in free green areas, sprout from surrounding greenery, or form small associations at considerable distances from parent trees (Figure 5). Fruits and seeds of IAS are very light and have well-developed dispersal structures that allow them to disperse more easily and have a high degree of germination. They are characterized by high vegetative and generative reproduction, the seeds germinate very quickly, which causes an uncontrolled spread on other public green areas. Invasive alien species can undisturbedly grow from concrete, stone, soil, etc., providing damage to the city's green infrastructure [30,137,138].

Figure 5. Invasive alien species on different public green areas.

Compared to native species, IAS are usually more widespread, more tolerant to different climatic conditions and possess highly competitive biological properties. For the reasons mentioned, they are easier to adapt to new environmental conditions, indicating that climate change and biological invasions have a synergistic effect on biodiversity [139–141]. The term used to describe IAS in the scientific literature is often characterized by the xenophobic expression of "biological invasions" or "hotspots" which inevitably contribute to the transmission of the message that naturalized species are enemies of people or nature [142]. Regardless of their shortcomings, these ornamental species provide significant benefits in the form of ecosystem services that have a positive impact on biodiversity. Programs to eradicate or control IAS can cause unwanted effects and further environmental degradation [143], which may prove even more harmful than the invasion itself over a longer period. Although the eradication of IAS is considered the best way to control and manage them, and many researchers tend to do so, it is not a necessary solution to reduce the degree of invasiveness on public green areas.

Invasive alien species can provide new resources that would improve the function of urban greenery through sustainable practices and nature-based green solutions, so these species should be approached as a rich source of raw material that provides a new ecosystem service [144–146]. Thus, IAS produce large quantities of fruits and seeds, which represent their tool for coexistence, but through their growth, these species also provides a by-product (biomass) that freely settles and decays on green areas. Many cities grapple with the challenge of invasive potential, necessitating appropriate measures like meticulous selection of planting materials or implementing green solutions to mitigate invasiveness [147,148]. The harvest of biomass from invasive alien species can notably decrease their invasive potential by curbing vegetative reproduction, allelopathic effects, competition, and the release of toxic substances into the environment. In this way, the sustainability of ornamentals would be achieved, influencing the preservation of urban infrastructure through sustainable practices [149,150]. Many studies claim that IAS could be utilized as a source of bioenergy and biopesticides. Table 4 provides insight into the potential of some moderately or highly invasive plant material for the production of environmentally friendly products.

Table 4. The potential of different invasive alien species for the production of different forms of bioenergy and biopesticides.

Species Common Name	Species Latin Name	Invasive Potential *	Biomass	Biofuel	Biodiesel	Biogas	Biopesticides	References
Box elder	*Acer negundo* L.	High	✓**	✓	✓			[151]
Tree of heaven	*Ailanthus altisima* (Mill.) Swingle.	High	✓	✓	✓	✓	✓	[152–157]
False indigo-bush	*Amorpha fruticosa* L.	High	✓	✓	✓	✓	✓	[156,158–161]
Russian olive	*Elaengus angustifolia* L.	Moderate	✓	✓	✓		✓	[162]
Japanese knotweed	*Falopia japonica* (Houtt.) Ronse Decr.	High	✓	✓	✓		✓	[163–166]
Rose of Sharon	*Hibiscus syriacus* L.	Moderate	✓	✓	✓			[30,32,167]
Chinese golden rain	*Koelreuteria paniculata* Laxm.	High	✓	✓	✓		✓	[30,32,53,71]
Foxglove tree	*Paulownia tomentosa* Siebold & Zucc.	High	✓	✓	✓	✓	✓	[168–170]
Virginia creeper	*Partenocissus quenquefolia* (L.) Planch.	High	✓	✓	✓			[29,32]
Staghorn sumac	*Rhus typhina* L.	High	✓	✓	✓			[171,172]
Black locust	*Robinia pseudoacacia* L.	High	✓	✓	✓	✓	✓	[151,173–175]
Oriental cedar	*Thuja orientalis* L.	Moderate	✓	✓	✓		✓	[32,176–179]

* According to Stojanović and Jovanović [179]; Pušić et al. [29], Anačkov et al. [180]. ** Check mark indicates the confirmed potential.

On average, invasive plant species exhibited a greater total number of secondary metabolites in comparison to native species. Lugli et al. [181] provided the review of numerous utilization possibilities of Paulownia species, broadly used in the traditional medicine due to high content of phenolics and antioxidant compounds. The studies showed that its flowers, fruits, leaves, and bark contain compounds with anti-inflammatory, antioxidant, neuroprotective, antibacterial, antiviral, antiphlogistic, and cytotoxic activity [182–185].

The elevated chemical diversity and distinct phytochemical composition observed in invasive plant species may serve as indicators of their biological invasion potential [186]. The chemical properties and constituents of these plants make them good candidates for environmentally friendly biopesticides. Additionally, *Falopia japonica* (Houtt.) a highly invasive species currently highly expanding in Romania, a neighboring country of Serbia, is one of the richest sources of resveratrol, of an interested in medicinal purposes [187]. Its rhizome is well known for its antioxidant and anticholinesterase effects [187,188]. A recent study showed that the aerial parts also represent valuable source of biologically active phenolic secondary metabolites, including besides resveratrol, rutin, and rosmarinic and chlorogenic acid, which are mostly stored in leaves and stems, while plant extracts have shown significant potential in anti-cancer therapy [188,189].

Mdee et al. [190] explored acetone extracts from various parts (flowers, leaves, seeds, and fruits) of seven invasive plant species found in South Africa as potential reservoirs of antifungal agents against various plant pathogenic fungi. The fungitoxic properties of these extracts suggest the potential of IAS as natural sources of fungicides. Antifungal efficacy was observed across all tested plant species; however, leaf extracts exhibited greater activity in inhibiting the mycelial growth of various pathogens compared to seed or flower extracts. Popov et al. [191] examined the fungicidal activity of the *Asclepias syriaca* water and methanol extracts against the three plant pathogenic fungi isolates. The findings from this study indicate that the water extract of *A. syriaca* exhibits notable fungistatic and potential fungicidal effects against the tested plant pathogenic fungi, suggesting its potential utility as a biological control agent against them.

Extracts of six invasive weed species growing in sub-Saharan Africa were investigated in different concentrations over two years on common bean plants. Each tested plant species provided effective control of key pest species, resulting in bean yields aligned to those achieved with standard pesticides. Furthermore, the plant-based pesticide treatments showed significantly fewer adverse effects on natural enemies [192]. Tanasković et al. [193] assessed the antifeeding and insecticidal activity of 0.5%, 1%, and 2% extracts derived from the bark and leaves of *Ailanthus altissima* against *Lymantria dispar* larvae (gypsy moth) in laboratory settings. The study's findings suggest that these extracts from *A. altissima* bark and leaves could serve as cost-effective natural protectants capable of managing gypsy moth populations in ecosystems. Specifically, the bark extracts exhibited strong antifeeding activity and significant insecticidal effects on gypsy moth larvae across all tested concentrations.

Allelopathic activity can be one of the key mechanisms enabling the spread of invasive species into new habitats and their dominance in communities. Allelopathic activity varies depending on the type of plant organ tested and the habitat from which they were taken. Allelopathy is an adaptive ecological phenomenon whereby plants release biochemical compounds into their environment that influence the growth, survival, and reproduction of neighboring organisms [194,195]. These compounds, known as allelochemicals, can have diverse effects, ranging from inhibiting the germination and growth of competitor plants to deterring herbivores and pathogens. The study of allelopathy has gained increasing attention in the recent years due to its implications for agriculture, ecology, and natural resource management. Understanding how plants interact chemically with their environment through allelopathy provides valuable insights into ecosystem dynamics, plant community structure, and strategies for sustainable weed and pest management, as promising nature-based solutions. Allelochemicals may have positive, negative or even deadly effects on target plants [195]. Extracts of some invasive plant species could be used as bioherbicides in weed control. Balah et al. [196] presented that extracts of *Solanum elaeagnifolium* had significant phytotoxic effects on summer and winter weeds in Egypt. The same authors also demonstrate that extracts of *S. elaeagnifolium* could have negative physiological effects on cultivated crops too. Extracts of some other invasive plant species have negative effects on physiological and biochemical parameters of crops. Popov et al. [191] showed that the *A. syriaca* water extract caused notable inhibition of germination in maize, soybean, and sunflower, whereas no inhibition was observed with the methanol extract compared to the control. Additionally, both types of tested extracts significantly decreased the shoot and root length of all the plants under examination. Extracts of invasive plant *Ambrosia trifida* can induce severe oxidative stress in sunflower seedlings [104]. Seedlings of soybean and maize expressed more tolerance to the applied extracts of this plant.

Essential oils play a vital role in the allelopathic interactions among plants and their effect spans over the habitats, influencing weeds, microorganism and insects. IAS-derived essential oils such as from *T. orientalis* [197] and *Eucalyptus* sp. [198] express strong herbicidal effects toward numerous weedy species, comparable to glyphosate, suiting them as bioherbicides.

6. Conclusions

Natural resources' utilization based on the principles of circular economy encourages the creation and implementation of nature-based solutions, leading to sustainable development on both a local and global level. The production of bioenergy and biopesticides from abundant biomass sources brings numerous benefits, including improvements in biomass and biowaste management, reduced utilization of non-renewable energy sources, mitigation of related environmental issues, sustainable agricultural practices implementation and biodiversity preservation. The analysis of published papers and statistical databases showed that although Serbia has high potential for the production of bioenergy, including biopower and biofuels, the amount of renewable energy acquired from the available biomass sources is substantially low. Currently, the utilization of biomass for the purposes of biopower production is mostly realized. The energy produced from biomass, including firewood, wood chips and residue, in 2020 accounted for 14.83% of the total amount of primary energy production. With the estimated potential of over 280 thousand tons of annual biodiesel output, production based on available feedstock utilization could provide enough biofuels to replace 10–20% of diesel fuel consumed for transport in Serbia. Substantial areas of unused land for the production of non-edible energy crops offer an alternative approach to the acquisition of biofuels without jeopardizing the already insecure food production, seriously affected by climate change. Estimated production of bioethanol in Serbia reaches 3 million tons per year, while the estimated potential of biogas production based just on the utilization of municipal solid waste is around 95 million m^3 annually, not counting the potential for utilizing other raw materials. In 2021, around 30–35% of energy utilized in the sectors of electricity and heating and cooling belonged to renewable energy, while the share of energy from renewable sources in the sector of transport was less than 1%. In 2022, the share of renewable energy was around 27%, in relation to the gross final energy consumption in Serbia. To meet the established goal of achieving a 32% share of energy acquired from renewable sources by 2030, set by the last adopted EU Directive, numerous enhancements are required to ensure continuous growth in the Serbian energy sector. In the market for plant protection products, biopesticides occupy a small share, with only 16 registered products, showing that Serbia still largely relies on the use of chemical pesticides. From 2015 to 2020, biopesticides comprised only 1.3% of the total market share, with the majority of imported biopesticides being in the form of bioinsecticides. More research efforts are needed to recognize the importance of botanicals in sustainable plant protection, in order to raise public awareness and initiate adequate policies. As an important source of biomass and biowaste, invasive alien species could be utilized for the purposes of both bioenergy and biopesticide production, which will prevent the need for their eradication from green areas and provide additional ecosystem services from the existing greenery. Investigated study shows that many invasive species hinder potentials for these sustainable strategies, including *Acer negundo* L., *Ailanthus altisima* (Mill.) Swingle., *Amorpha fruticosa* L., *Elaengus angustifolia* L., *Falopia japonica* (Houtt.) Ronse Decr., *Hibiscus syriacus* L., *Koelreuteria paniculata* Laxm., *Paulownia tomentosa* Siebold & Zucc., *Partenocissus quenquefolia* (L.) Planch., *Rhus typhina* L., *Robinia pseudoacacia* L. and *Thuja orientalis* L.

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References

1. Xu, M.; Sun, H.; Gao, M.; Wang, Q.; Wu, C. Bioconversion of biowaste into renewable energy and resources: A sustainable strategy. *Environ. Res.* **2022**, *214*, 113929. [CrossRef]
2. Behrooznia, L.; Sharifi, M.; Hosseinzadeh-Bandbafha, H. Comparative life cycle environmental impacts of two scenarios for managing an organic fraction of municipal solid waste in Rasht-Iran. *J. Clean. Prod.* **2020**, *268*, 122217. [CrossRef]
3. Akbi, A.; Saber, M.; Aziza, M.; Yassaa, N. An overview of sustainable bioenergy potential in Algeria. *Renew. Sustain. Energy Rev.* **2017**, *72*, 240–245. [CrossRef]
4. Shah, A.V.; Singh, A.; Sabyasachi Mohanty, S.; Kumar Srivastava, V.; Varjani, S. Organic solid waste: Biorefinery approach as a sustainable strategy in circular bioeconomy. *Bioresour. Technol.* **2022**, *349*, 126835. [CrossRef]
5. Vyas, S.; Prajapati, P.; Shah, A.V.; Varjani, S. Municipal solid waste management: Dynamics, risk assessment, ecological influence, advancements, constraints and perspectives. *Sci. Total Environ.* **2022**, *814*, 152802. [CrossRef] [PubMed]
6. Chilakamarry, C.R.; Mimi Sakinah, A.M.; Zularisam, A.W.; Sirohi, R.; Khilji, I.A.; Ahmad, N.; Pandey, A. Advances in solid-state fermentation for bioconversion of agricultural wastes to value-added products: Opportunities and challenges. *Bioresour. Technol.* **2022**, *343*, 126065. [CrossRef]
7. Aniza, R.; Chen, W.H.; Petrissans, A.; Hoang, T.A.; Ashokkumar, V.; Petrissans, M. A review of biowaste remediation and valorization for environmental sustainability: Artificial intelligence approach. *Environ. Pollut.* **2023**, *324*, 121363. [CrossRef] [PubMed]
8. Demirbas, A. Biofuels sources, biofuel policy, biofuel economy and global biofuel projections. *Energy Convers. Manag.* **2008**, *49*, 2106–2116. [CrossRef]
9. Williams, C.L.; Dahiya, A.; Porter, P. Introduction to bioenergy. In *Bioenergy*; Dahiya, A., Ed.; Academic Press: Cambridge, MA, USA, 2015; pp. 5–36.
10. Đurišić-Mladenović, L.N.; Predojević, J.Z.; Škrbić, D.B. Conventional and advanced liquid biofuels. *Chem. Ind.* **2016**, *70*, 225–241. [CrossRef]
11. Kundariya, N.; Mohanty, S.S.; Varjani, S.; Hao Ngo, H.W.C.; Wong, J.; Taherzadeh, M.J.; Chang, J.S.; Yong Ng, H.; Kim, S.H.; Bui, X.T. A review on integrated approaches for municipal solid waste for environmental and economical relevance: Monitoring tools, technologies, and strategic innovations. *Bioresour. Technol.* **2021**, *342*, 125982. [CrossRef]
12. Dar, S.A.; Khan, Z.H.; Khan, A.A.; Ahmad, S.B. Biopesticides–Its Prospects and Limitations: An Overview. In *Perspective in Animal Ecology and Reproduction*; Astral International (P) Ltd.: New Delhi, India, 2019; pp. 296–314.
13. Rajput, V.S.; Jhala, J.; Acharya, V.S. Biopesticides and their mode of action against insect pests: A review. *Int. J. Chem. Stud.* **2020**, *8*, 2856–2862. [CrossRef]
14. Axon, C.J.; Darton, R.C. Sustainability and risk—A review of energy security. *Sustain. Prod. Consum.* **2021**, *27*, 1195–1204. [CrossRef]
15. Schyns, J.F.; Vanham, D. The Water Footprint of Wood for Energy Consumed in the European Union. *Water* **2019**, *11*, 206. [CrossRef]
16. Fingerman, K.R.; Nabuurs, G.J.; Iriarte, L.; Fritsche, U.R.; Staritsky, I.; Visser, L.; Mai-Moulin, T.; Junginger, M. Opportunities and risks for sustainable biomass export from the south-eastern United States to Europe. *Biofuel Bioprod. Biorefining* **2019**, *13*, 281–292. [CrossRef]
17. Hansson, J.; Berndes, G.; Englund, O.; De Freitas, F.L.; Sparovek, G. How is biodiversity protection influencing the potential for bioenergy feedstock production on grasslands? *Bioenergy* **2019**, *11*, 517–538. [CrossRef]
18. Corona, B.; Shen, L.; Reike, D.; Carreón, J.R.; Worrell, E. Towards sustainable development through the circular economy—A review and critical assessment on current circularity metrics. *Resour. Conserv. Recycl.* **2019**, *151*, 104498. [CrossRef]
19. Popp, J.; Lakner, Z.; Harangi-Rákos, M.; Fari, M. The effect of bioenergy expansion: Food, energy, and environment. *Renew. Sustain. Energy Rev.* **2014**, *32*, 559–578. [CrossRef]
20. Chakravorty, U.; Hubert, M.H.; Nøstbakken, L. Fuel versus food. *Ann. Rev. Resour. Econ.* **2009**, *1*, 645–663. [CrossRef]
21. Hoekstra, A.Y.; Gerbens-Leenes, P.W.; Vander Meer, T.H. The water footprint of bio-energy. In *Climate Change and Water: International Perspectives on Mitigation and Adaptation*; Howe, C.J., Smith, B., Henderson, J., Eds.; American Water Works Association: Denver, CO, USA; IWA Publishing: London, UK, 2010; pp. 81–95.
22. UN General Assembly. *Transforming Our World: The 2030 Agenda for Sustainable Development, 21 October 2015*; United Nations General Assembly: New York, NY, USA, 2015.
23. Al, A.R.; Bikić, S.; Radojčin, M. Bioenergy conversion technologies: A review and case study. *J. Process. Energy Agric.* **2023**, *27*, 30–38. [CrossRef]
24. Semenčenko, D.; Semenčenko, V.; Mosurović Ružičić, M. Development in Renewable Energy Production in Serbia with the Emphasis on Bioethanol. In *New Business Models and Sustainable Competitiveness: Symposium Proceedings*; Marković, A., Barjaktarović Rakočević, S., Eds.; Faculty of Organizational Sciences: Belgrade, Serbia, 2014; pp. 1642–1648.
25. Lovrić, N.; Ostoić, S.K.; Vuletić, D.; Stevanov, M.; Đorđević, I.; Stojanovski, V.; Curman, M. The future of the forest-based bioeconomy in selected southeast European countries. *Futures* **2021**, *128*, 102725. [CrossRef]
26. Janevski, J.N.; Stojanović, B.V.; Laković, M.S.; Stojiljković, M.M.; Mitrović, D.M. Wood biomass in Serbia–Resources and possibilities of use. *Energy Sources Part B Econ. Plan. Policy* **2016**, *11*, 732–738. [CrossRef]

27. Prvulovic, S.; Josimovic, L.; Matic, M.; Tolmac, D.; Radovanovic, L. Resource potential and scope of the use of renewable energy sources in Serbia. *Energy Sources Part B Econ. Plan. Policy* **2016**, *11*, 901–910. [CrossRef]
28. Vukelić, I.; Milošević, S.; Đurđević, D.; Racić, G.; Tot, V. Sustainable transition of the Republic of Serbia: Measuring capacity for circularity in agriculture and rural areas. *Energy Sustain. Soc.* **2023**, *13*, 34. [CrossRef]
29. Pušić, M.; Narandžić, T.; Ostojić, J.; Grubač, M.; Ljubojević, M. Assessment and potential of ecosystem services of ornamental dendroflora in public green areas. *Environ. Sci. Pollut. Res.* **2023**, *30*, 2850–2865. [CrossRef]
30. Ljubojević, M.; Tomić, M.; Simikić, M.; Savin, L.; Narandžić, T.; Pušić, M.; Grubač, M.; Vejnović, S.; Marinković, M. *Koelreuteria paniculata* invasiveness, yielding capacity and harvest date influence on biodiesel feedstock properties. *J. Environ. Manag.* **2021**, *25*, 113102. [CrossRef] [PubMed]
31. Constable, C.E. (Ed.) Preface to Transitioning to Affordable and Clean Energy. In *Transitioning to Affordable and Clean Energy*; Transitioning to Sustainability Series 7; MDPI: Basel, Switzerland, 2022; pp. 1–3.
32. Ljubojević, M.; Narandžić, T.; Ostojić, J.; Božanić Tanjga, B.; Grubač, M.; Kolarov, R.; Greksa, A.; Pušić, M. Rethinking Horticulture to Meet Sustainable Development Goals—The Case Study of Novi Sad, Serbia. *Horticulturae* **2022**, *8*, 1222. [CrossRef]
33. Krellenberg, K.; Bergsträßer, H.; Bykova, D.; Kress, N.; Tyndall, K. Urban sustainability strategies guided by the SDGs—A tale of four cities. *Sustainability* **2019**, *11*, 1116. [CrossRef]
34. Vijay, V.; Chandra, R.; Subbarao, P.M.V. Biomass as a means of achieving rural energy self-sufficiency: A concept. *Built Environ. Proj. Asset Manag.* **2021**, *12*, 382–400. [CrossRef]
35. Korhonen, J.; Nuur, C.; Feldmann, A.; Birkie, S.E. Circular economy as an essentially contested concept. *J. Clean Prod.* **2018**, *175*, 544–552. [CrossRef]
36. Kakwan, S.N.; Kalbar, P.P. Review of Circular Economy in urban water sector: Challenges and opportunities in India. *J. Environ. Manag.* **2020**, *271*, 111010. [CrossRef]
37. Kumar, S.S.; Kumar, V.; Kumar, R.; Malyan, S.K.; Pugazhendhi, A. Microbial fuelcells as a sustainable platform technology for bioenergy, biosensing, environmentalmonitoring, and other low power device applications. *Fuel* **2019**, *255*, 115682. [CrossRef]
38. Ghisellini, P.; Cialani, C.; Ulgiati, S. A review on circular economy: The expected transition to a balanced interplay of environmental and economic systems. *J. Clean Prod.* **2016**, *114*, 11–32. [CrossRef]
39. Kirchherr, J.; Reike, D.; Hekkert, M. Conceptualizing the circular economy: An analysis of 114 definitions. *Resour. Conserv. Recycl.* **2017**, *127*, 221–232. [CrossRef]
40. Kapoor, R.; Ghosh, P.; Kumar, M.; Sengupta, S.; Gupta, A.; Kumar, S.S.; Vijay, V.; Kumar, V.; Vijay, V.K.; Pant, D. Valorization of agricultural waste for biogas based circular economy in India: A research outlook. *Bioresource Technol.* **2020**, *304*, 123036. [CrossRef] [PubMed]
41. Fidélis, T.; Cardoso, A.S.; Riazi, F.; Miranda, A.C.; Abrantes, J.; Teles, F.; Roebeling, P.C. Policy narratives of circular economy in the EU—Assessing the embeddedness of water and land in national action plans. *J. Clean Prod.* **2021**, *288*, 125685. [CrossRef]
42. Fertahi, S.; Elalami, D.; Tayibi, S.; Taarji, N.; Lyamlouli, K.; Bargaz, A.; Oukarroum, A.; Zeroua, Y.; Bouhssini, M.E.; Barakat, A. The current status and challenges of biomass biorefineries in Africa: A critical review and future perspectives for bioeconomic development. *Sci. Total Environ.* **2023**, *870*, 162001. [CrossRef] [PubMed]
43. Addo-Bankas, O.; Zhao, Y.; Gomes, A.; Stefanakis, A. Challenges of urban artificial landscape water bodies: Treatment techniques and restoration strategies towards ecosystem services enhancement. *Processes* **2022**, *10*, 2486. [CrossRef]
44. Calheiros, C.S.; Stefanakis, A.I. Green roofs towards circular and resilient cities. *Circ. Econ. Sustain.* **2021**, *1*, 395–411. [CrossRef]
45. IEA Bioenergy, Technology Collaboration Programme: Bioenergy, a Sustainable Solution. Available online: https://www.ieabioenergy.com/bioenergy-a-sustainable-solution/ (accessed on 4 April 2023).
46. REN21. Renewables 2023 Global Status Report Collection, Global Overview. 2023. Available online: https://www.ren21.net/wp-content/uploads/2019/05/GSR2023_GlobalOverview_Full_Report_with_endnotes_web.pdf (accessed on 15 January 2024).
47. REN21. Renewables 2023 Global Status Report Collection, Renewables in Energy Supply. 2023. Available online: https://www.ren21.net/wp-content/uploads/2019/05/GSR-2023_Energy-Supply-Module.pdf (accessed on 15 January 2024).
48. Statistical Office of the Republic of Serbia. Share of Renewable Energy in Gross Final Energy Consumption. Available online: https://data.stat.gov.rs/Home/Result/SDGUN070201?languageCode=en-US (accessed on 17 January 2024).
49. Ali, G.; Nitivattananon, V.; Abbas, S.; Sabir, M. Green waste to biogas: Renewable energy possibilities for Thailand's green markets. *Renew. Sustain. Energy Rev.* **2012**, *16*, 5423–5429. [CrossRef]
50. Dodić, S.; Zekić, V.; Rodić, V.; Tica, N.; Dodić, J.; Popov, S. Situation and perspectives of waste biomass application as energy source in Serbia. *Renew. Sustain. Energy Rev.* **2010**, *14*, 3171–3177. [CrossRef]
51. Dodić, S.; Vučurović, D.; Popov, S.; Dodić, J.; Zavargo, Z. Concept of cleaner production in Vojvodina. *Renew. Sustain. Energy Rev.* **2010**, *14*, 1629–1634. [CrossRef]
52. Bajić, Ž.B.; Dodić, N.S.; Vučurović, G.D.; Dodić, M.J.; Grahovac, A.J. Waste-to-energy status in Serbia. *Renew. Sustain. Energy Rev.* **2015**, *50*, 1437–1444. [CrossRef]
53. Tomić, M.; Ljubojević, M.; Mićić, R.; Simikić, M.; Dulić, J.; Narandžić, T.; Čukanović, J.; Sentić, I.; Dedović, N. Oil from *Koelreuteria paniculata* Laxm. 1772 as possible feedstock for biodiesel production. *Fuel* **2020**, *277*, 118162. [CrossRef]
54. Statistical Pocketbook of the Republic of Serbia. 2023. Available online: https://publikacije.stat.gov.rs/G2023/PdfE/G202317016.pdf (accessed on 17 January 2024).

55. The Energy Development Strategy of the Republic of Serbia NARS (National Assembly of the Republic of Serbia), Ministry of Mining and Energy, Republic of Serbia. Energy Sector Development Strategy of the Republic of Serbia for the Period by 2025 with Projections by 2030. 2016. Available online: https://meemp-serbia.com/wp-content/uploads/2018/09/Legislative-Energy-Sector-Development-Strategy-of-the-Republic-of-Serbia-for-the-period-by-2025-with-projections-by-2030.pdf (accessed on 17 January 2024).
56. Jovanović, B.; Parović, M. Status and Development of Biomass in Serbia, Jefferson Institute, Belgrade. 2009. Available online: http://www.jeffersoninst.org/sites/default/files/Biomass.pdf (accessed on 21 January 2024).
57. Radojević, U.; Ninković, M.; Milovanović, J. Identification of marginal land suitable for biofuel production in Serbia. *Acta Reg. Environ.* **2015**, *12*, 51–55. [CrossRef]
58. Djordjevic, J.S.; Djordjevic-Milošević, B.S.; Milošević, M.S. Assessment of Conditions and Experience for Plantation of Agro-Energy Crops on Degraded Agricultural Land in Serbia. *Int. J. Agric. Biosyst. Eng.* **2016**, *10*, 447–450.
59. Nonhebel, S. Energy yields in intensive and extensive biomass production systems. *Biomass Bioenergy* **2002**, *22*, 159–167. [CrossRef]
60. Statistical Office of the Republic of Serbia. Energy Balances. 2021. Available online: https://publikacije.stat.gov.rs/G2023/PdfE/G20235693.pdf (accessed on 17 January 2024).
61. Brunner, P.H.; Rechberger, H. Waste to energy—Key element for sustainable waste management. *Waste Manag.* **2015**, *37*, 3–12. [CrossRef]
62. Bloomberg New Energy Finance. *Bioenergy Leadership Forum Results Book*; Bloomberg NEF Publishing: London, UK, 2012.
63. Đurišić-Mladenović, N.; Kiss, F.; Škrbić, B.; Tomić, M.; Mićić, R.; Predojević, Z. Current state of the biodiesel production and the indigenous feedstock potential in Serbia. *Renew. Sustain. Energy Rev.* **2018**, *81*, 280–291. [CrossRef]
64. Demirbas, A. Progress and recent trends in biodiesel fuels. *Energy Convers. Manag.* **2009**, *50*, 14–34. [CrossRef]
65. Gui, M.M.; Lee, K.T.; Bhatia, S. Feasibility of edible oil vs. non-edible oil vs. waste edible oil as biodiesel feedstock. *Energy* **2008**, *33*, 1646–1653. [CrossRef]
66. Latinović, L. Production and mandatory use of biodiesel in Serbia from the aspect of economic impact on the population. *Serbian J. Eng. Manag.* **2019**, *4*, 29–38. [CrossRef]
67. Babović, V.N.; Dražić, G.D.; Đorđević, M.A. Potential uses of biomass from fast-growing crop *Miscanthus* x *giganteus*. *Chem. Ind.* **2012**, *66*, 223–233. (In Serbian) [CrossRef]
68. Đurić, N.; Mladenović Glamočlija, M.; Đokić, M.; Spasić, M.; Glamočlija, Đ. Introduction of tall grasses in Serbia agricultural production and using biomass as alternative fuel. In *Thematic Proceedings: International Scientific Conference Sustainable Agriculture and Rural Development*; Institute of Agricultural Economics: Belgrade, Serbia, 2021; pp. 259–269. Available online: http://RIVeC.institut-palanka.rs/handle/123456789/344 (accessed on 3 April 2023).
69. Važić, T.; Svirčev, Z.; Dulić, T.; Krstić, K.; Obreht, I. Potential for energy production from reed biomass in the Vojvodina region (north Serbia). *Renew. Sustain. Energy Rev.* **2015**, *48*, 670–680. [CrossRef]
70. Nikolić, M.; Tomasević, V.; Ugrinov, D. Energy plants as biofuel source and as accumulators of heavy metals. *Chem. Ind.* **2022**, *76*, 209–225. [CrossRef]
71. Khan, I.U.; Yan, Z.; Chen, J. Production and characterization of biodiesel derived from a novel source *Koelreuteria paniculata* seed oil. *Energies* **2020**, *13*, 791. [CrossRef]
72. Filipčić, P. Use of Biomass Invasive Plant Type of Japanese Knotweed (*Reynoutria japonica*) in Energy Production. Ph.D. Thesis, University of Zagreb, Faculty of Agriculture, Department of Agricultural Technology, Storage and Transport, Zagreb, Croatia, 2018. Available online: https://urn.nsk.hr/urn:nbn:hr:204:149547 (accessed on 8 November 2023). (In Croatian).
73. Jan, H.A.; Al-Fatesh, A.S.; Osman, A.I.; Surina, I.; Rahim, F.; Sher, A. Assessment of *Ailanthus altissima* seed oil as a potential source for biodiesel production using nickel oxide nanoparticles catalyst. *J. King Saud Univ. Sci.* **2024**, *36*, 103084.
74. Domínguez, E.; Romaní, A.; Domingues, L.; Garrote, G. Evaluation of strategies for second generation bioethanol production from fast growing biomass Paulownia within a biorefinery scheme. *Appl. Energy* **2017**, *187*, 777–789. [CrossRef]
75. Reyes, Y.A.; Pérez, M.; Barrera, E.L.; Martínez, Y.; Cheng, K.K. Thermochemical conversion processes of *Dichrostachys cinerea* as a biofuel: A review of the Cuban case. *Renew. Sustain. Energy Rev.* **2022**, *160*, 112322. [CrossRef]
76. Reza, M.S.; Ahmed, A.; Caesarendra, W.; Bakar, M.S.A.; Shams, S.; Saidur, R.; Aslfattahi, N.; Azad, A.K. *Acacia holosericea*: An Invasive Species for Bio-char, Bio-oil, and Biogas Production. *Bioengineering* **2019**, *6*, 33. [CrossRef] [PubMed]
77. Latinović, L.; Stojić, N.; Latinović, J. Important factors in the revival of the biodiesel industry in Serbia: Progress or pitfall? *Serbian J. Eng. Manag.* **2020**, *5*, 1–19. [CrossRef]
78. Latinović, L. Biodiesel in Serbia—Benefit or trap? In *International Scientific-Practical Conference on Circular and Bio-Economy*; CIBEK: Belgrade, Serbia, 2019; pp. 280–294.
79. Tolmač, D.; Prvulović, S.; Štrbac, N.; Radovanović, L. Materially and energy balance production of biodiesel. *Savrem. Poljopr. Teh.* **2009**, *35*, 185–190.
80. Furman, T. *Biodizel, Alternativno i Ekološko tečno Gorivo*; Poljoprivredni Fakultet: Novi Sad, Serbia, 2005; p. 212. ISBN 86-7520-090-0; 978-86-7520-090-1.
81. Samardžija, M.; Furman, T.; Tomić, M.; Savin, L.; Nikolić, R.; Simikić, M. Prednosti proizvodnje biodizela u malim postrojenjima. *Savrem. Poljopr. Teh.* **2007**, *33*, 196–204.

82. Mojović, L.; Nikolić, S.; Pejin, D.; Pejin, J.; Djukić-Vuković, A.; Kocić-Tanackov, S.; Semenčenko, V. The potential for sustainable bioethanol production in Serbia: Available biomass and new production approaches, Materials and processes for energy: Communicating current research and technological developments (A. Méndez-Vilas, Ed.). *Formatex* **2013**, 380–392. Available online: http://www.formatex.info/energymaterialsbook/book/380-392.pdf (accessed on 21 January 2024).
83. Nikolić, V.; Žilić, S.; Radosavljević, M.; Simić, M. The role of maize hybrids in current trends of bioethanol production. *Sel. Semen.* **2021**, *26*, 21–29. [CrossRef]
84. Dodić, J.; Grahovac, J.; Rončević, Z.; Pajović-Šćepanović, R.; Dodić, S.; Bajić, B.; Vučurović, D. Challenges in bioethanol production from intermediate and by-products of the sugar beet processing in the Republic of Serbia. *J. Process. Energy Agric.* **2018**, *22*, 34–39. [CrossRef]
85. Simić, A.; Dželetović, Ž. Perspektive gajenja energetskih useva u Srbiji. *Savetov. Poljopr. Agron. Srb.* **2018**, 34–38.
86. Kostić, M.; Stamenković, O.; Veljković, V. Oil Recovery from Roadside Pennycress (*Thlaspi alliaceum* L.) Seeds and its Application for Biodiesel Production. In Proceedings of the 22th International Conference Meeting Point of the Science and Practice in the Fields of Corrosion, Materials and Environmental Protection, Tara Mountain, Serbia, 13–16 September 2021; pp. 183–194.
87. Martinov, M.; Scarlat, N.; Djatkov, D.; Dallemand, J.F.; Viskovic, M.; Zezelj, B. Assessing sustainable biogas potentials—Case study for Serbia. *Biomass Convers. Biorefinery* **2020**, *10*, 367–381. [CrossRef]
88. Angelidaki, I.; Treu, L.; Tsapekos, P.; Luo, G.; Campanaro, S.; Wenzel, H.; Kougias, P.G. Biogas upgrading and utilization: Current status and perspectives. *Biotechnol. Adv.* **2018**, *36*, 452–466. [CrossRef] [PubMed]
89. Petravić-Tominac, V.; Nastav, N.; Buljubašić, M.; Šantek, B. Current state of biogas production in Croatia. *Energy Sustain. Soc.* **2020**, *10*, 8. [CrossRef]
90. Šarac, V.; Milić, D.; Vukelić, N.; Novaković, T.; Novaković, D.; Ljubojević, M.; Rodić, V. Assessment of Beef Manure Economic Value by the Method of Equivalent Green and Mineral Fertilizer Substitution. *Horticulturae* **2024**, *10*, 125. [CrossRef]
91. Horváth, S.I.; Tabatabaei, M.; Karimi, K.; Kumar, R. Recent updates on biogas production—A review. *BRJ* **2016**, *3*, 394–402. [CrossRef]
92. Flach, B.; Lieberz, S.; Rossetti, A.; Phillips, S. *EU-28 Biofuels Annual 2017*; GAIN Report Number: NL7015; USDA Foreign Agricultural Service: Washington, DC, USA, 2017. Available online: https://gain.fas.usda.gov/Recent%20GAIN%20Publications/Biofuels%20Annual_The%20Hague_EU-28_6-19-2017.pdf (accessed on 30 January 2023).
93. Cvetković, S.; Radoičić, T.K.; Vukadinović, B.; Kijevčanin, M. Potentials and status of biogas as energy source in the Republic of Serbia. *Renew. Sustain. Energy Rev.* **2014**, *31*, 407–416. [CrossRef]
94. Rakašćan, N. Cirkularni Model Proizvodnje Biogasa iz Silaže Sirka (*Sorghum bicolor*) Proizvedenog na Degradiranom Zemljištu uz Primenu Digestata kao Organskog đubriva. Ph.D. Thesis, Singidunum University, Belgrade, Serbia, 2023. Available online: https://nardus.mpn.gov.rs/handle/123456789/21160 (accessed on 10 January 2024).
95. Cvetkovic, S.M.; Radoičić, T.K.; Kijevcanin, M. Perspective of using biogas in Serbia in European context. *Energy Sources Part B Econ. Plan. Policy* **2017**, *12*, 372–376. [CrossRef]
96. Djatkov, D.; Viskovic, M.; Golub, M.; Bojic, S.; Martinov, M. Potentials, opportunities and barriers for biogas production and utilization in Autonomous Province of Vojvodina. In Proceedings of the 42nd International Symposium on Agricultural Engineering, Actual Tasks on Agricultural Engineering, Opatija, Croatia, 25–28 February 2014; pp. 415–425.
97. Eurostat. Available online: https://ec.europa.eu/eurostat/en/web/main/data/database (accessed on 10 January 2023).
98. Babić, I.; Petrović, M. Development of legal framework for bigger usage of renewable energy sources in Serbia from 2013 to 2020. *KGH—Klim. Grej. Hlađenje* **2017**, *42*, 47–50. Available online: https://izdanja.smeits.rs/index.php/kgh/article/view/1444 (accessed on 21 January 2024). (In Serbian)
99. Spasojević, N. The role of the Energy agency of the Republic of Serbia in the regulation of energy from renewable sources—Case study of "Čibuk 1". *Adm. Public Policy* **2022**, *17*, 33–56. (In Serbian) [CrossRef]
100. Kovačević, B.L.; Kuzman, M. Development of energy regulations of the European Union and impact on the legal system of the Republic of Serbia. In *65 Godina od Rimskih Ugovora: Evropska unija i Perspektive Evropskih Integracija Srbije*; The Institute of Comparative Law: Belgrade, Serbia, 2022; pp. 275–293. (In Serbian) [CrossRef]
101. Đurić, O.E.; Kreculj, D.; Živojinović, D.; Vorkapić, M. Potencijal poljoprivredne biomase u sistemima proizvodnje biogasa u Republici Srbiji. *Zb. Međunarodne Konf. Obnov. Izvorima Električne Energ.–MKOIEE* **2020**, *8*, 63–70. (In Serbian) [CrossRef]
102. Milosevic Law Firm. New Incentives for Investment into Renewable Energy Sources. Available online: https://milosevic-law.com/new-incentives-for-investment-into-renewable-energy-sources/ (accessed on 28 January 2024).
103. Mishra, A.; Shetti, N.P.; Basu, S.; Reddy, K.R.; Aminabhavi, T.M. Recent developments in ionic liquid-based electrolytes for energy storage super-capacitors and rechargeable batteries. In *Green Sustainable Process for Chemical and Environmental Engineering and Science*; Elsevier: Amsterdam, The Netherlands, 2020; pp. 199–221.
104. Šućur, J.; Konstantinović, B.; Crnković, M.; Bursić, V.; Samardžić, N.; Malenčić, Đ.; Prvulović, D.; Popov, M.; Vuković, G. Chemical composition of *Ambrosia trifida* L. and its allelopathic influence on crops. *Plants* **2021**, *10*, 2222. [CrossRef] [PubMed]
105. Bedini, S.; Cosci, F.; Tani, C.; Pierattini, E.C.; Venturi, F.; Lucchi, A.; Ioriatti, C.; Ascrizzi, R.; Flamini, G.; Ferroni, G.; et al. Essential Oils as Post-Harvest Crop Protectants against the Fruit Fly *Drosophila suzukii*: Bioactivity and Organoleptic Profile. *Insects* **2020**, *11*, 508. [CrossRef]
106. Hanie Amin, H. Ulva lactuca as a cheap and safe biopesticide in fields and its chemical composition (in vitro). *Egypt. J. Aquat. Biol. Fish.* **2019**, *23*, 415–428. [CrossRef]

107. Gruľová, D.; Caputo, L.; Elshafie, H.S.; Baranová, B.; De Martino, L.; Sedlák, V.; Gogaľová, Z.; Poráčová, J.; Camele, I.; De Feo, V. Thymol Chemotype *Origanum vulgare* L. Essential Oil as a Potential Selective Bio-Based Herbicide on Monocot Plant Species. *Molecules* **2020**, *25*, 595. [CrossRef]
108. Synowiec, A.; Możdżeń, K.; Krajewska, A.; Landi, M.; Araniti, F. *Carum carvi* L. essential oil: A promising candidate for botanical herbicide against *Echinochloa crus-galli* (L.) P. Beauv. in maize cultivation. *Ind. Crops Prod.* **2019**, *140*, 111652. [CrossRef]
109. Golawska, S.; Kapusta, I.; Lukasik, I.; Wojcicka, A. Effect of phenolics on the pea aphid, *Acyrthosiphon pisum* (Harris) population on *Pisum sativum* L. (*Fabaceae*). *Pestycydy/Pestic.* **2008**, *3–4*, 71–77.
110. Di Ilio, V.; Cristofaro, M. Polyphenolic extracts from the olive mill wastewater as a source of biopesticides and their effects on the life cycle of the Mediterranean fruit fly *Ceratitis capitata* (*Diptera*, *Tephriditae*). *Int. J. Trop. Insect. Sci.* **2021**, *41*, 359–366. [CrossRef]
111. Official Journal of the European Union. *Directive 2009/128/EC of the European Parliament and of the Council of 21 October 2009*; European Parliament, Council of the European Union: Bruxelles/Brussel, Belgium, 24 November 2009; p. L 309/71.
112. Sundh, I.; Goettel, M.S. Regulating biocontrol agents: A historical perspective and a critical examination comparing microbial and microbial agents. *BioControl* **2013**, *58*, 575–593. [CrossRef]
113. Ministry of Agriculture, Water Management and Forestry. List of Products for Plant Protection in Organic Agricultural Production. Available online: https://uzb.minpolj.gov.rs/wp-content/uploads/2023/05/Lista_sredstva_za_zastitu_bilja_za_organsku_proizvodnju_na_30maj2023.pdf (accessed on 30 January 2024).
114. Milić, D.; Novaković, T.; Grahovac, M.; Budakov, D.; Grahovac, J.; Vlajkov, V.; Loc, M.; Tekić, D. The Pesticide Market in Serbia. *Contemp. Agric.* **2023**, *72*, 6–13. [CrossRef]
115. Vlajkov, V.; Grahovac, M.; Budakov, D.; Loc, M.; Pajčin, I.; Milić, D.; Novaković, T.; Grahovac, J. Distribution, Genetic Diversity and Biocontrol of Aflatoxigenic *Aspergillus flavus* in Serbian Maize Fields. *Toxins* **2021**, *13*, 687. [CrossRef] [PubMed]
116. Galanakis, C.M. Recovery of high added-value components from food wastes: Conventional, emerging technologies and commercialized applications. *Trends Food Sci. Technol.* **2012**, *26*, 68–87.
117. Ballardo, C.; Barrena, R.; Artola, A.; Sánchez, A. A novel strategy for producing compost with enhanced biopesticide properties through solid-state fermentation of biowaste and inoculation with *Bacillus thuringiensis*. *Waste Manag.* **2017**, *70*, 53–58. [CrossRef] [PubMed]
118. Leccese, F.; Cagnetti, M.; Giarnetti, S.; Petritoli, E.; Orioni, B.; Luisetto, I.; Tuti, S.; Leccisi, M.; Pecora, A.; Maiolo, L.; et al. Electronic Nose For Pesticides: The First Study towards A Smart Analysis. *Contemp. Agric.* **2019**, *68*, 17–22. [CrossRef]
119. Šunjka, D.; Mechora, Š. An alternative source of biopesticides and improvement in their formulation—Recent advances. *Plants* **2022**, *11*, 3172. [CrossRef] [PubMed]
120. Golijan-Pantović, J.; Sečanski, M. Biopesticides in organic agriculture. *Contemp. Agric.* **2022**, *71*, 141–154. [CrossRef]
121. Samada, L.H.; Tambunan, U.S.F. Biopesticides as Promising Alternatives to Chemical Pesticides: A Review of Their Current and Future Status. *J. Biol. Sci.* **2020**, *20*, 66–76. [CrossRef]
122. Tanović, B.; Milijašević, S.; Obradović, A.; Todorović, B.; Rekanović, E.; Milikić, S. In vitro efekti etarskih ulja iz začinskihi lekovitih biljaka na patogene koji se prenose zemljištem. *Pestic. Fitomed.* **2004**, *19*, 233–240.
123. European Commission. A new Circular Economy Action Plan For a Cleaner and More Competitive Europe. 2020. Available online: https://eur-lex.europa.eu/legalcontent/EN/TXT/?qid=1583933814386&uri=COM:2020:98:FIN (accessed on 5 May 2023).
124. Simberloff, D.; Martin, J.L.; Genovesi, P.; Maris, V.; Wardle, D.A.; Aronson, J.; Courchamp, F.; Galil, B.; García-Berthou, E.; Pascal, M. Impacts of biological invasions: What's what and the way forward. *Trends Ecol. Evol.* **2013**, *28*, 58–66. [CrossRef]
125. Li, X.; Liu, X.; Kraus, F. Risk of biological invasions is concentrated in biodiversity hotspots. *Front. Ecol. Environ.* **2016**, *14*, 411–417. [CrossRef]
126. Pathak, R.; Negi, V.S.; Rawal, R.S.; Bhatt, I.D. Alien plant invasion in the Indian Himalayan Region: State of knowledge and research priorities. *Biodivers. Conserv.* **2019**, *28*, 3073–3102. [CrossRef]
127. Convention on Biological Diversity (CBD). *Alien Species That Threaten Ecosystems, Habitats or Species*; United Nations Article 2008, 8(h). Convention on Biological Diversity (CBD) COP 6 Decision: Alien species that threaten ecosystems, habitats or species. VI/23. In Sixth Meeting of the Confer-ence of the Parties to the Convention on Biological Diversity. The Hague, Netherlands. 7–19 April 2002. Available online: http://www.cbd.int/decision/cop/default.shtml?id=7197 (accessed on 23 March 2023).
128. Pyšek, P.; Richardson, D.M. Invasive species, environmental change and management: And health. *Annu. Rev. Environ. Res.* **2010**, *35*, 25–55. [CrossRef]
129. Pyšek, P.; Richardson, D.M.; Rejmánek, M.; Webster, G.L.; Williamson, M.; Kirschner, J. Alien plants in checklists and floras: Towards better communication between taxonomists and ecologists. *Taxon* **2004**, *53*, 131–143. [CrossRef]
130. Richardson, D.M.; Pysek, P.; Rejmánek, M.; Barbour, M.G.; Panetta, F.D.; West, C.J. Naturalization and invasion of alien plants: Concepts and definitions. *Divers. Distrib.* **2000**, *6*, 93–107. [CrossRef]
131. Seebens, H.; Blackburn, T.M.; Dyer, E.E.; Genovesi, P.; Hulme, P.E.; Jeschke, J.M.; Pagad, S.; Pyšek, P.; van Kleunen, M.; Winter, M.; et al. Global rise in emerging alien species results from accessibility of new source pools. *Proc. Natl. Acad. Sci. USA* **2018**, *115*, 2264–2273. [CrossRef]
132. van Kleunen, M.; Essl, F.; Pergl, J.; Brundu, G.; Carboni, M.; Dullinger, S.; Early, R.; Gonzalez-Moreno, P.; Groom, J.Q.; Hulme, P.E.; et al. The changing role of ornamental horticulture in alien plant invasions. *Biol. Rev.* **2018**, *93*, 1421–1437. [CrossRef]
133. Raud, M.; Mitt, M.; Oja, T.; Olt, J.; Orupold, K.; Kikas, T. The utilisation potential of urban greening waste: Tartu case study. *Urban For. Urban Green.* **2017**, *21*, 96–101. [CrossRef]

134. Pyšek, P.; Hulme, P.E.; Simberloff, D.; Bacher, S.; Blackburn, T.M.; Carlton, T.J.; Dawson, W.; Essl, F.; Foxcroft, C.L.; Genovesi, P.; et al. Scientists' warning on invasive alien species. *Biol. Rev.* **2020**, *95*, 1511–1534. [CrossRef]
135. Vrabič-Brodnjak, U.; Možina, K. Invasive Alien Plant Species for Use in Paper and Packaging Materials. *Fibers* **2022**, *10*, 94. [CrossRef]
136. Boršić, I.; Kutleša, P.; Desnica, S.; Slivar, S. Invasive Potential of Golden Rain Tree (*Koelreuteria Paniculata* Laxm., *Sapindaceae*)—A Case Study from the City of Zagreb. In Proceedings of the 2nd Croatian Symposium on Invasive Species with International Participation, Zagreb, Croatia, 21–22 November 2016.
137. Ghermandi, A.; Fichtman, E. Cultural ecosystem services of multifunctional constructed treatment wetlands and waste stabilization ponds: Time to enter the mainstream? *J. Ecol. Eng.* **2015**, *84*, 615–623. [CrossRef]
138. Sladonja, B.; Sušek, M.; Guillermic, J. Review on invasive tree of heaven (*Ailanthus altissima* (Mill.) Swingle) conflicting values: Assessment of its ecosystem services and potential biological threat. *Environ. Manag.* **2015**, *56*, 1009–1034. [CrossRef]
139. Bradley, B.A.; Oppenheimer, M.; Wilcove, D.S. Climate change and plant invasions: Restoration opportunities ahead? *Global Chang. Biol.* **2009**, *15*, 1511–1521. [CrossRef]
140. Bellard, C.; Cassey, P.; Blackburn, T.M. Alien species as a driver of recent extinctions. *Biol. Lett.-UK* **2016**, *12*, 20150623. [CrossRef]
141. Hellmann, J.J.; Byers, J.E.; Bierwagen, B.G.; Dukes, J.S. Five potential consequences of climate change for invasive species. *Conserv. Biol.* **2008**, *22*, 534–543. [CrossRef]
142. Larson, B.M.H. The war of the roses: Demilitarizing invasion biology. *Front. Ecol. Environ.* **2005**, *3*, 495–500. [CrossRef]
143. Rinella, M.J.; Maxwell, B.D.; Fay, P.K.; Weaver, T.; Sheley, R.L. Control effort exacerbates invasive-species problem. *Ecol. Appl.* **2009**, *19*, 155–162. [CrossRef]
144. Shackleton, C.M.; McGarry, D.; Fourie, S.; Gambiza, J.; Shackleton, S.E.; Fabricius, C. Assessing the effects of invasive alien species on rural livelihoods: Case examples and a framework from South Africa. *Hum. Ecol.* **2007**, *35*, 113–127. [CrossRef]
145. Mwangi, E.; Swallow, B. *Prosopis juliflora* invasion and rural livelihoods in the Lake Baringo area of Kenya. *Conserv. Soc.* **2008**, *6*, 130–140.
146. Palmer, S.; Martin, D.; DeLauer, V.; Rogan, J. Vulnerability and adaptive capacity in response to the Asian long horned beetle infestation in Worcester, Massachusetts. *Hum. Ecol.* **2014**, *42*, 265–977. [CrossRef]
147. Brandner, R.; Schickhofer, G. Tree-of-Heaven (Ailanthus altissima): Enormous and wide potential neglected by the western civilisation. In Proceedings of the WCTE 2010 Conference, Trento, Italy, 20–24 June 2010; pp. 1576–1582.
148. Grimm, N.B.; Faeth, S.H.; Golubiewski, N.E.; Redman, C.L.; Wu, J.; Bai, X.; Briggs, J.M. Global change and the ecology of cities. *Science* **2008**, *319*, 756–760. [CrossRef]
149. Velasco-Jiménez, J.M.; Alcázar, P.; Cariñanos, P.; Galán, C. Allergenicity of the urban green areas in the city of Córdoba (Spain). *Urban For. Urban Green.* **2020**, *49*, 126600. [CrossRef]
150. Leichenko, R. Climate change and urban resilience. *Curr. Opin. Environ. Sustain.* **2011**, *3*, 164–168. [CrossRef]
151. Mudryk, K. Quality assessment for briquettes made of biomass from maple [*Acer negundo* L.] and black locust [*Robinia pseudoacacia* L.]. *Inżynieria Rol.* **2011**, *15*, 115–121.
152. Hoseini, S.S.; Najafi, G.; Ghobadian, B.; Mamat, R.; Ebadi, M.T.; Yusaf, T. *Ailanthus altissima* (tree of heaven) seed oil: Characterisation and optimisation of ultrasonication-assisted biodiesel production. *Fuel* **2018**, *220*, 621–630. [CrossRef]
153. Hoseini, S.S.; Najafi, G.; Ghobadian, B.; Mamat, R.; Ebadi, M.T.; Yusaf, T. Novel environmentally friendly fuel: The effects of nanographene oxide additives on the performance and emission characteristics of diesel engines fuelled with *Ailanthus altissima* biodiesel. *Renew. Energy* **2018**, *125*, 283–294. [CrossRef]
154. Jabeen, M.; Munir, M.; Abbas, M.M.; Ahmad, M.; Waseem, A.; Saeed, M.; Kalam, M.A.; Zafar, M.; Sultana, S.; Mohamed, A.; et al. Sustainable production of biodiesel from novel and non-edible *Ailanthus altissima* (Mill.) seed oil from green and recyclable potassium hydroxide activated Ailanthus cake and cadmium sulfide catalyst. *Sustainability* **2022**, *14*, 10962. [CrossRef]
155. Khan, I.U.; Chen, H.; Yan, Z.; Chen, J. Extraction and quality evaluation of biodiesel from six familiar non-edible plants seeds. *Processes* **2021**, *9*, 840. [CrossRef]
156. Kozuharova, E.; Benbassat, N.; Berkov, S.; Ionkova, I. *Ailanthus altissima* and *Amorpha fruticosa*–invasive arboreal alien plants as cheap sources of valuable essential oils. *Pharmacia* **2020**, *67*, 71–81. [CrossRef]
157. Terzopoulou, P.; Kamperidou, V.; Barboutis, I. Utilization Potential of Tree-of-Heaven Species Biomass—A Review. *Appl. Sci.* **2023**, *13*, 9185. [CrossRef]
158. Xiong, S.; Zhang, Q.G.; Zhang, D.Y.; Olsson, R. Influence of harvest time on fuel characteristics of five potential energy crops in northern China. *Bioresource Technol.* **2008**, *99*, 479–485. [CrossRef]
159. Krpan, A.P.; Tomašić, Ž.; Zečić, Ž.; Vuletić, D. Bioproductivity of indigobush (*Amorpha fruticosa* L.) in one-year, two-year and four-year rotation. *Šumarski List.* **2015**, *139*, 123–134.
160. Jakovljević, T.; Halambek, J.; Radošević, K.; Hanousek, K.; Gradečki-Poštenjak, M.; Gaurina Srček, V.; Radojčić Redovniković, I.; De Marco, A. The potential use of Indigobush (*Amorpha fruticosa* L.) as natural resource of biologically active compounds. *South-East Eur. For. SEEFOR* **2015**, *6*, 171–178. [CrossRef]
161. Grabić, J.; Ljevnaić-Mašić, B.; Zhan, A.; Benka, P.; Heilmeier, H. A review on invasive false indigo bush (*Amorpha fruticosa* L.): Nuisance plant with multiple benefits. *Ecol. Evol.* **2022**, *12*, e9290. [CrossRef]

162. Anjum, S.I.; Husain, S.; Khan, H.U.; Attaullah, M.; Rajput, S.; Shah, A.H.; Buneri, I.D.; Shah, A.H. Toxicity assessment of the methanol extract from *Elaeagnus angustifolia* against larvae of *Drosophila melanogaster meign* (*Diptera/Drosophilidae*). *J. Entomol. Zool. Stud.* **2017**, *5*, 217–220.
163. Hennequin, L.M.; Polizzi, K.; Fennell, P.S.; Hallett, J.P. Rhododendron and Japanese Knotweed: Invasive species as innovative crops for second generation biofuels for the ionoSolv process. *RSC Adv.* **2021**, *11*, 18395–18403. [CrossRef]
164. Brunerova, A.; Muller, M.; Brozek, M. Potential of wild growing Japanese knotweed (*Reynoutria japonica*) for briquette production. In Proceedings of the 16th International Scientific Conference Engineering for Rural Development, Jelgava, Latvia, 24–26 May 2017; pp. 24–26.
165. Van Meerbeek, K.; Muys, B.; Hermy, M. Lignocellulosic biomass for bioenergy beyond intensive cropland and forests. *Renew. Sustain. Energy Rev.* **2019**, *102*, 139–149. [CrossRef]
166. Wens, A.; Geuens, J. In vitro and in vivo antifungal activity of plant extracts against common phytopathogenic fungi. *J. Biosci. Biotechnol.* **2022**, *11*, 15–21.
167. Ljubojević, M.; Pušić, M. Review on ornamental Rose of sharon (*Hibiscus syriacus* L.): Assessment of decorativeness, invasiveness and ecosystem services in public. In *Sustainable Practices in Horticulture and Landscape Architecture*; Ostojić, J., Cig, A., Eds.; Iksad: Ankara, Turkey, 2022; pp. 71–144. ISBN 978-625-8323-13-9.
168. Rodríguez-Seoane, P.; Díaz-Reinoso, B.; Moure, A.; Domínguez, H. Potential of *Paulownia* sp. for biorefinery. *Ind. Crops Prod.* **2020**, *155*, 112739. [CrossRef]
169. Angelova-Romova, M.; Koleva, A.; Antova, G.; Zlatanov, M.; Stoyanova, M.; Dobreva, K.; Denev, P.; Damianova, S.; Angelov, B.; Stoyanova, A. Lipid composition of Paulownia seeds grown in Bulgaria. *Trak. Üniv. Fen Bilim. Derg.* **2011**, *12*, 101–111.
170. Del Río, P.G.; Domínguez, V.D.; Domínguez, E.; Gullón, P.; Gullón, B.; Garrote, G.; Romaní, A. Comparative study of biorefinery processes for the valorization of fast-growing Paulownia wood. *Bioresource Technol.* **2020**, *314*, 123722. [CrossRef]
171. Khan, I.U.; Yan, Z.; Chen, J. Optimization, transesterification and analytical study of *Rhus typhina* non-edible seed oil as biodiesel production. *Energies* **2019**, *12*, 4290. [CrossRef]
172. Ruan, C.J.; Xing, W.H.; da Silva, J.A.T. Potential of five plants growing on unproductive agricultural lands as biodiesel resources. *Renew. Energy* **2012**, *41*, 191–199. [CrossRef]
173. Manzone, M.; Bergante, S.; Facciotto, G. Energy and economic sustainability of woodchip production by black locust (*Robinia pseudoacacia* L.) plantations in Italy. *Fuel* **2015**, *140*, 555–560. [CrossRef]
174. Paczkowski, S.; Sauer, C.; Anetzberger, A.; Jaeger, D.; Pelz, S. Utilization of black locust (*Robinia pseudoacacia*) sawdust as an alternative pelletization raw material. *Biomass Conv. Bioref.* **2023**, 1–15. [CrossRef]
175. Jiang, H.; Wang, J.; Song, L.I.; Cao, X.; Yao, X.I.; Tang, F.; Yue, Y. Chemical composition of an insecticidal extract from *Robinia pseudacacia* L. seeds and it's efficacy against aphids in oilseed rape. *Crop Prot.* **2018**, *104*, 1–6. [CrossRef]
176. Devi, A.; Das, V.K.; Deka, D. A green approach for enhancing oxidation stability including long storage periods of biodiesel via *Thuja oreantalis* L. as an antioxidant additive. *Fuel* **2019**, *253*, 1264–1273. [CrossRef]
177. Longanesi, L.; Pereira, A.P.; Johnston, N.; Chuck, C.J. Oxidative stability of biodiesel: Recent insights. *Biofuels Bioprod. Biorefining* **2022**, *16*, 265–289. [CrossRef]
178. Mozaffari, F.; Abbasipour, H.; Garjan, A.S.; Saboori, A.; Mahmoudvand, M. Efficacy of *Thuja orientalis* L.(*Cupressaceae*) essential oil on the two spotted spider mite, *Tetranychus urticae* Koch (*Acari*: *Teteranychidae*). *J. Essent. Oil Bear. Pl.* **2012**, *15*, 550–556. [CrossRef]
179. Stojanović, V.; Jovanović, I. Pregled invazivnih i potencijalno invazivnih vrsta biljaka u Republici Srbiji i okruženju u cilju utvrđivanja njihovog statusa na nacionalnom nivou/The survey of invasive and potentially invasive plant species in serbia and neighbouring countries for the purpose of determining their status at the national level. *Zaštita Prir./Nat. Prot.* **2018**, *68*, 41–59. (In Serbian)
180. Anačkov, G.T.; Rat, M.M.; Radak, B.D.; Igić, R.S.; Vukov, D.M.; Rućando, M.M.; Krstivojević, M.M.; Radulović, B.S.; Milič, M.D.; Panjković, I.B.; et al. Alien invasive neophytes of the Southeastern part of the Pannonian Plain. *Cent. Eur. J. Biol.* **2013**, *8*, 1032–1043. [CrossRef]
181. Lugli, L.; Mezzalira, G.; Lambardi, M.; Zhang, H.; La Porta, N. *Paulownia* spp.: A Bibliometric Trend Analysis of a Global Multi-Use Tree. *Horticulturae* **2023**, *9*, 1352. [CrossRef]
182. Lee, J.W.; Seo, K.H.; Ryu, H.W.; Yuk, H.J.; Park, H.A.; Lim, Y.; Ahn, K.S.; Oh, S.R. Anti-inflammatory effect of stem bark of Paulownia tomentosa Steud. in lipopolysaccharide (LPS)-stimulated RAW264. 7 macrophages and LPS-induced murine model of acute lung injury. *J. Ethnopharmacol.* **2018**, *210*, 23–30. [CrossRef]
183. Móricz, Á.M.; Ott, P.G.; Knaś, M.; Długosz, E.; Krüzselyi, D.; Kowalska, T.; Sajewicz, M. Antibacterial potential of the phenolics extracted from the Paulownia tomentosa L. leaves as studied with use of high-performance thin-layer chromatography combined with direct bioautography. *J. Liq. Chromatogr. Relat. Technol.* **2019**, *42*, 282–289. [CrossRef]
184. Zhang, J.K.; Li, M.; Li, M.; Du, K.; Lv, J.; Zhang, Z.G.; Zheng, X.K.; Feng, W.S. Four C-geranyl flavonoids from the flowers of Paulownia fortunei and their anti-inflammatory activity. *Nat. Prod. Res.* **2020**, *34*, 3189–3198. [CrossRef] [PubMed]
185. Adach, W.; Żuchowski, J.; Moniuszko-Szajwaj, B.; Szumacher-Strabel, M.; Stochmal, A.; Olas, B.; Cieslak, A. In vitro antiplatelet activity of extract and its fractions of Paulownia Clone in Vitro 112 leaves. *Biomed. Pharmacother.* **2021**, *137*, 111301. [CrossRef]
186. Macel, M.; de Vos, R.C.H.; Jansen, J.J.; van der Putten, W.H.; van Dam, N.M. Novel chemistry on invasive plants: Exotic species have more unique metabolomic profiles than native congeners. *Ecol. Evol.* **2014**, *4*, 2777–2786. [CrossRef]

187. Negrea, B.-M.; Stoilov-Linu, V.; Pop, C.-E.; Deák, G.; Crăciun, N.; Făgăraș, M.M. Expansion of the Invasive Plant Species *Reynoutria japonica* Houtt in the Upper Bistrița Mountain River Basin with a Calculus on the Productive Potential of a Mountain Meadow. *Sustainability* **2022**, *14*, 5737. [CrossRef]
188. Božin, B.; Gavrilović, M.; Kladar, N.; Rat, M.; Anačkov, G.; Gavarić, N. Highly invasive alien plant *Reynoutria japonica* Houtt. represents a novel source for pharmaceutical industry–Evidence from phenolic profile and biological activity. *J. Serb. Chem. Soc.* **2017**, *82*, 803–813. [CrossRef]
189. Zhang, X.G.; Ma, G.Y.; Kou, F.; Liu, W.J.; Sun, Q.Y.; Guo, G.J.; Ma, X.D.; Guo, S.J.; Zhu, J.N. *Reynoutria Japonica* from Traditional Chinese Medicine: A Source of Competitive Adenosine Deaminase Inhibitors for Anticancer. *Comb. Chem. High Throughput Screen.* **2019**, *22*, 113–122. [CrossRef] [PubMed]
190. Mdee, L.K.; Masoko, P.; Eloff, J.N. The activity of extracts of seven common invasive plant species on fungal phytopathogens. *S. Afr. J. Bot.* **2009**, *75*, 375–379. [CrossRef]
191. Popov, M.; Grahovac, M.; Loc, M.; Prvulović, D.; Budakov, D.; Konstantinović, B.; Samardžić, N.; Stojanović, T. Antimicrobial activity of the *Asclepias syriaca* L. root extract. *Rom. Agric. Res.* **2023**, *40*, 1–7. [CrossRef]
192. Mkindi, A.G.; Mpumi, N.; Tembo, Y.L.; Stevenson, P.C.; Ndakidemi, P.; Mtei, K.; Machunda, R.L.; Belmain, S.R. Invasive weeds with pesticidal properties as potential new crops. *Ind. Crops Prod.* **2017**, *110*, 113–122. [CrossRef]
193. Tanasković, S.; Gvozdenac, S.; Kolarov, R.; Bursić, V.; Konstantinović, B.; Prvulović, D. Antifeeding and insecticidal activity of *Ailanthus altissima* and *Morus alba* extracts against gipsy moth (*Lymantia dispar* (L.), *Lepidoptera*, *Lymantridae*) larvae under laboratory conditions. *J. Entomol. Res. Soc.* **2021**, *23*, 197–212.
194. Bhadoriya, S.S.; Ganeshpurkar, A.; Narwaria, J.; Rai, G.; Jain, A.P. *Tamarindus indica*: Extent of explored potential. *Pharmacogn. Rev.* **2011**, *5*, 73.
195. Mushtaq, M.; Akram, S. Ionic Liquid for the Extraction of Plant Phenolics. In *Nanotechnology-Based Industrial Applications of Ionic Liquids*; Inamuddin, A.A., Ed.; Nanotechnology in the Life Sciences; Springer International Publishing: Cham, Switzerland, 2020; pp. 81–97. [CrossRef]
196. Balah, M.A.; Hassany, W.M.; Mousa, E.E.D.A. Response of invasive *Solanum elaeagnifolium* Cav. seed germination and growth to different conditions and environmental factors. *Biologia* **2021**, *76*, 1409–1418. [CrossRef]
197. Amri, I.; Hanana, M.; Jamoussi, B.; Hamrouni, L. Chemical composition of *Thuja orientalis* L. essential oils and study of their allelopathic potential on germination and seedling growth of weeds. *Arch. Phytopathol. Plant Prot.* **2015**, *48*, 18–27.
198. Amri, I.; Khammassi, M.; Ben Ayed, R.; Khedhri, S.; Mansour, M.B.; Kochti, O.; Pieracci, Y.; Flamini, G.; Mabrouk, Y.; Gargouri, S.; et al. Essential Oils and Biological Activities of *Eucalyptus falcata*, *E. sideroxylon* and *E. citriodora* Growing in Tunisia. *Plants* **2023**, *12*, 816. [CrossRef] [PubMed]