

## Type of Waste as a Factor of Economic Development of Households and Environmental Protection in Rural Environments

Bratislav Pešić<sup>1</sup>, Nikola Stolić<sup>1</sup>, Nebojša Zlatković<sup>1</sup>

<sup>1</sup>*Academy of Southern Serbia, Leskovac, Serbia*

### Abstract

The research was conducted in the villages of Jablanica, district Orašac, Jarsenovo, and Stupnica, a rural area on the territory of the City of Leskovac. The paper aims to determine the mortality rate, to identify significant farmers in rural areas and to maintain sustainable agricultural production as a means of the economic development of the local community and the protection of the environment in which they live. For that purpose, the farmer survey method was used to identify and describe the factors that use the amount of waste generated on farms and its impact on the environment. Appropriate methods were used to separate the waste into organic and inorganic, which was later used as a mineral additive in the fields (organic) or harmlessly removed (inorganic). A random sample of 60 agricultural farms was surveyed in order to determine the impact of waste of different origin on the environment. The results of the research show that the factors that use the amount and types of waste influenced the farmers' perception. The questionnaire proved to be reliable, as the Cronbach's alpha coefficient is 0.539 (Cronbach's Alpha 0.539). At the same time, the way in which waste is collected, stored, classified, and used is important for its utilization with the necessary economic upgrade per production unit and reduction of harmful work in the environment, and proper use.

*Key words:* farmers, economic development, waste, environmental protection.

## Introduction

Regardless of its origin, waste can be hazardous not only to the ecosystem, but it also represents a potential danger due to the possible explosiveness due to the production of methane, which is produced beneath the deep layers in the absence of oxygen. Waste refers to any material or item that arises during the process of production, service, or other activities, items excluded from use, as well as waste materials that arise from consumption and which are not intended for further use from the aspect of manufacturer or consumer and have to be discarded. Inadequate waste management is one of the biggest problems from the aspect of environmental protection of the Republic of Serbia and it is the result of inadequate attitude of the society towards waste.

Waste first appeared in the period of accelerated industrialization of the country, which was followed by a real risk of strategic resources depletion in a very short period of time and progressive increase in total amount of solid waste. These events were not followed by an appropriate environmental policy.

Waste may be categorized in a variety of ways: by composition, by location, and by toxicity. It is definitely true that man plays a big role in waste types since he is creating it with his activities, whereby waste can be classified as packaging waste, agricultural and garden waste, construction waste, animal waste, sludge, sediments, ash, slag, etc. The places where the industrial production is not developed and the population is exclusively engaged in agricultural production also represent potential hot spots that disturb the ecosystem and the environment. During the agricultural production, different types of waste occur, which depends on the agricultural area, the method of production, and the degree of its development.

Agricultural waste includes mechanical waste, plastic (e.g. containers and pots for seedling production), plastic packaging (from pesticides, mineral additives etc.), veterinary products, construction waste, cardboard and paper, metal, wood, glass, ceramics, rubber, ash, animal waste, harvesting, and herbal residues. Some waste generated during the agricultural production process is treated as hazardous waste, including phyto-pharmaceuticals, used machine oil, asbestos, lead-acid batteries, fluorescent tubes. In addition to the aforementioned waste in rural households, there is also manure as a by-product or waste, but the manure is not treated as a waste if it is used for fertilizing agricultural land. The manure is a by-product that is created in the process of livestock production. Proper depositing, sorting, and classifying waste of different origin may control a number of negative, not only environmental, but also social and economic consequences. It is obvious nowadays that the conventional (intensive production), agricultural method contributes to the emergence of these and similar problems, despite the fact that it

provides enough food and other products essential for life. Work must be done to prevent the so-called "environmental diseases", primarily biocenosis that relates to the loss of genetic resources of cultivated and wild plants and animals, the elimination of natural enemies, increased pest attacks and their resistance to pesticides, chemical pollution, and destruction of natural control mechanisms (Altieri et al., 2011). The degradation of natural resources is not only an environmental but also social, political, and economic problem. It is certain that where the economic political dominance of agribusiness is in the concept of rural development, the interests of consumers, small family households, the environment, and local communities will be jeopardized. Increasing the awareness of the population, their sociological improvement, their agro-ecological education and the sense of agribusiness, and economic development will affect the stability of our local communities, the improvement of rural areas and areas with difficult working conditions, and the preservation of the environment. The aim of the research was to determine whether and in what percentage the types of waste, which are generated within a farm, affect the environment and the realization of additional economic value.

## Material and Methods

The research included the residents of three villages (Orašac, Jarsenovo, and Stupnica), which are located in Jablanica district, the territory of the City of Leskovac. The villages are located at an altitude of 690 m. The majority of population in these villages are older people, with an average age of 53.9. In total, there are 371 households and 602 residents. The majority of the population (91%) is engaged in agricultural production, plant (crop and fruit), and cattle production (raising cows and sheep).

Big technical and structural changes in the world market, resulting from the globalization of agricultural production and strengthening the competition in the process of agricultural production, led to changes in these processes in rural areas, where agriculture was a traditional source of income. Such processes have affected all rural areas in the Republic of Serbia, where the results are very negative in terms of agricultural, economic, environmental, and social trends, as well as the unfavourable situation characterized by a number of problems: small and uncompetitive households, a large number of older people's households, divided and crushed agricultural land, small production land, extensiveness and low technological level of production, insufficient use of agro-technical measures, poor productivity, poor manure and agricultural waste management, and more. Such agriculture is poor, uncompetitive and unprofitable, and from today's point of view, it cannot be a factor in sustainable development

(Milanović, 2009). For this reason, all necessary measures are taken to maintain such production in such areas by adopting various measures, both at national and local level, in order to help the development of primary production and to generate income with such households, so as not to jeopardize biodiversity and the environment.

The parameters that were monitored on agricultural farms were indicators, the examination and analysis of which determined the guidelines, the role and the significance of small farmers in this rural area, and the impact of sustainable agriculture on the economic development of the local community and environmental protection. With the help of a questionnaire (Gašić et al., 2015), which contains twenty four (24) statements aimed at examining the amount of waste produced in farms, its origin, the method of disposal, separation and storage of waste of different origin, the transport of waste, the direct benefit of delivery of quantities of secondary waste, as well as indirect benefits from waste of organic origin. Using a random sample, 30% of the total number of households, was surveyed in order to determine the impact of waste of different origins on the environment.

## Results and Discussion

The questionnaire proved to be reliable, because the Cronbach's alpha coefficient is 0.539.

Table 1. The impact of waste on the farm's economic development

Environmental waste	Inorganic waste	Organic waste	Pesticide packaging
Orašac	0.154	0.023*	0.046*
Jarsenovo	0.044*	0.131	0.139
Stupnica	0.124	0.038*	0.038*

\*P<0.05

Source: respondents' private questionnaires

The population in the aforementioned villages partially performed the separation, that is, the classification and separation of the produced waste. The type of waste obtained was in direct correlation with the size of animal herds in these villages. The villages in which a large number of animals were present produced a higher amount of organic waste used for cultivation of their own land and as a substitute for mineral fertilizers. The villages with fewer animals had to assign extra money to buy mineral fertilizers used for agricultural soil cultivation.

Also, the plant protection products used for the purpose of agricultural production, primarily pesticide packaging, influenced the economic development of the farmers, because they had the possibility to rinse the packaging and obtain additional amounts of protection products for plants and animals, as well as due to the return of empty pesticide packaging, farmers had an additional cash discount when purchasing new amounts of protection products. In that case, the processing of statistical data showed high statistical significance in terms of production and use of organic waste in relation to the number of animals with a value  $P < 0.05$ , as well as statistical significance in terms of exploitation of pesticide packaging and pesticide residues with a value  $P < 0.05$ .

Further processing of data revealed that inorganic waste had no significance for the economic development of the population, since the creation and accumulation of inorganic waste was in direct correlation with the financial possibilities of the rural population.

The creation and accumulation of waste had a different impact on the state of the environment in the villages where the surveys on agricultural population were conducted. Statistical data processing has determined that inorganic waste and pesticide packaging, in which pesticide residues were located, significantly affected the type of waste that, in turn, affected environmental pollution with its content. The reason lies in the fact that environmental pollution was higher in villages where there was less organic waste and in which the importance of more economical use of pesticides and pesticide packaging was not considered. By processing these data, it can be concluded that inorganic waste in villages with fewer animals showed statistical significance in terms of environmental pollution with a value  $P < 0.05$ .

The created landfills and types of waste, as well as the economic use and exploitation of waste, are certainly important when it comes to the economic development of farms and environmental protection.

Table 2. The effect of landfill type on the environment

Environmental waste	Inorganic waste	Organic waste	Pesticide packaging
Orašac	0.027*	0.148	0.139
Jarsenovo	1.123	0.046*	0.039*
Stupnica	0.036*	0.105	0.149

\* $P < 0.05$

Source: respondents' private questionnaires

Sustainable agriculture, cultivation of tradition, and subsidization of marginal and rural areas is aimed to increase the number of households engaged in agriculture, which is proved by the conclusion that the rural concept is based on rural and sustainable development. A versatile rural development is the concept of balanced development, the prevention of migration from rural areas; it contributes to structural changes and the attainment and adaptation to maximal social and environmental standards (Babović and Tasić, 2013).

The future of rural areas depends primarily on the possibility of people in the local community to create economic, social, cultural, and environmental development, find employment and live well in the ecological environment (Pešić et al., 2018). Then, territorial wealth, and the basis of competitiveness and the prospects of each local community stem from the readiness to rationally use, preserve, and promote natural resources and cultural and traditional heritage which constitute identity (Milić, 2011). Management of an integral rural economy requires new approaches in the development of certain geographical areas. The essential thing is the application of the principle of balanced development based on available resources in the centres of the area and on the periphery, with the main goal of achieving maximum socio-economic and environmental effects (Zakić, 2002).

Successful agricultural production is based on "healthy" soil that, through its biological activity and natural fertility, can enrich the addition of organic fertilizers, which can ensure the production with high nutritional value over a long period of time without reliance on large inputs outside the production system (Lampkin, 1999). The quality of the soil is affected by structural disturbance, reduction of organic matter, acidification, pollution, erosion, inorganic waste, various types of pesticides, as well as other types of inorganic waste that contaminate water. Thus, about 88% of the surface area of Serbia is exposed to water erosion. Wind erosion affects 80% of the territory, landslides 28% and more than a quarter of the surface is acidic, 13% strongly acidic, 17% moderately acidic, 30% weakly acidic and 22% neutral or basic soil (Šekularac et al., 2018).

One of the measures of protection and soil conservation is monitoring, which represents a permanent monitoring of the state of all changes in agricultural and non-agricultural land, particularly monitoring the contents of hazardous and harmful substances (Sekulić et al., 2008). Population migration from village to city as well as decreasing number of animals affect the economic power of our villages and the population living in them. A large number of scientists agreed with this conclusion and added that depopulation, intensive population ageing, negative migration balance, low fertility, and high mortality are some of the most important demographic characteristics of Serbia in the period from 2002 until 2011 (Panev and Marinković, 2012).

## Conclusion

The following conclusions can be drawn: The created landfills and types of waste, as well as economic use, and exploitation of waste types are important for the economic development of farms and for environmental protection; Organic waste can be used in the process of agricultural production and has a major impact on the economic development of the household; Versatile multifunctional development of rural areas affects employment, improving the quality of life of young people, women, and families in rural areas, while reducing poverty in rural areas and enhancing environmental protection; The production and application of microbiological fertilizers affects the development of protective biological resources in the production of ecological systems and the production of organic food; Secondary management of raw materials is an important segment of production that affects the economic development of processing; Proper use and handling of pesticides and pesticide packaging is of great importance to the economic growth of the population and to the protection of the environment; Proper resource management, environmental protection, conservation of biodiversity, adaptation and mitigation of climate change are key factors for sustainable development; The transfer of knowledge and innovation by professional advisory services, institutes, and faculties in households and family farms and the direction of the agricultural budget to subsidize and comprehensive development of rural areas has a significant role in the organization of family farms. In that way, the Agricultural Policy is coordinated with strategic development decisions and the agrarian budget, in accordance with the participation of agriculture and villages in the creation of the social product of Serbia.

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# Врста отпада као фактор економског развоја домаћинстава и заштите животне средине у руралним срединама

Братислав Пешић<sup>1</sup>, Никола Столић<sup>1</sup>, Небојша Златковић<sup>1</sup>

<sup>1</sup>Академија Јужна Србија, Лесковац, Србија

## Сажетак

Истраживање је спроведено у селима јабланичког округа Орашац, Јарсеново и Ступница, руралном подручју на територији Града Лесковца. Рад има за циљ да одреди смјернице, улогу и значај малих фармера у руралним подручјима и утицај одрживе пољопривреде на економски развој локалне заједнице и заштиту животне средине у којој обитавају. Том приликом коришћен је метод анкетирања фармера како би се идентификовали и описали фактори који утичу на количину отпада који се ствара на газдинствима и њихов утицај на животну средину. Одговарајућим методама извршено је одвајање и сепарација отпада, на органски и неоргански, који је касније коришћен као минерални додатак на њивама (органски) или нешкодљиво уклоњен (неоргански). Случајним узорком било је анкетирано 60 пољопривредних газдинства на тему: Утврђивање утицаја отпада различитог порекла на животну средину. Резултати истраживања показују да фактори који утичу на количину и врсту отпада имају утицај на перцепцију пољопривредних произвођача. Упитник се показао поузданим, Cronbah alfa коефицијент износи 0.539 (Cronbach's Alpha 0.539). Истовремено начин на који се прикупља отпад, лагерије, класира и употребљава има значај на његово искоришћавање са циљем економске надоградње по производној јединици и смањења штетног деловања на животну средину, његовом правилном употребом.

*Кључне ријечи:* фармери, економски развој, отпад, заштита животне средине.

*Corresponding author:* Bratislav Pešić  
*E-mail:* batta.pesic@gmail.com

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