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CULTURAL SERVICES PROVIDED BY URBAN ALLOTMENT GARDEN ECOSYSTEMS

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KULTUROWE ŚWIADCZENIA EKOSYSTEMOWE MIEJSKICH OGRODÓW DZIAŁKOWYCH

STRESZCZENIE: Zidentyfikowano 64 kulturowe świadczenia ekosystemowe dla miejskich ogrodów działkowych, na podstawie własnych studiów terenowych i literatury przedmiotu. Wpasowano je w ramy klasyfikacji CICES v.4.3. Reprezentują najniższy poziom tej klasyfikacji – typ klasy. Należą do jednej sekcji (kulturowych), dwóch działów, trzech grup i ośmiu klas. Wszystkie zestawiono w tabeli i przedyskutowano w świetle najnowszych publikacji naukowych.

SŁOWA KLUCZOWE: ekologia miasta, ekosystem miasta, ogród działkowy, świadczenia ekosystemów, zielona infrastruktura

Introduction

Among the quality of life factors in cities, the availability of the green infrastructure and possibility of the passive or active using it are of growing importance. Urban allotment gardens (UAGs) are a significant element of the green infrastructure. They are characterized by a high level of biodiversity, native species predominate in their spontaneous flora. The basic part of the biotic structure are cultivated plants[1], thus in this respect, UAGs are similar to urban home gardens. The common features of these two types are green sites is the similar level of provisioning and regulating ecosystem services. UAGs are positive distinguished, however, by specific cultural ecosystem services (CES). This results, amongst other things, from their location outside the permanent residents of users. J. Breuste[2] paid attention to the position of UAGs that indicated their intra-urban locations and the tradition of usage for growing fruits and vegetables. Recently, several papers use ecosystem services approach for consideration of benefits, which UAGs provide to their holders. J. Langemeyer et al.[3] gave an overview of the services offered by allotment gardens in Europe. A. Speak et al.[4] discussed the differences between the services provided by UAGs and parks in Manchester and Poznań. Camps-Calvet et al.[5] reported on the perception of services delivered by UAGs in Barcelona from the allotment users' point of view.

An attempt at summarizing the position of allotment gardens in the social-ecological system is the monograph by S. Bell et al.[6] It presents results of the multidisciplinary research carried out in the framework of the COST Action TU1201 Urban Allotment Gardens in European Cities – Future, Chal-

1 J. Borysiak, A. Mizgajski, A. Speak, *Floral biodiversity of allotment gardens and its contribution to urban green infrastructure*, "Urban Ecosystems" 2016, pp. 1–13.

2 J. Breuste, *Allotment gardens as part of urban green infrastructure: Actual trends and perspectives in Central Europe*, in: N. Müller, P. Werner, J.G. Kelcey (eds), *Urban Biodiversity and Design*, 2010, pp. 463–476.

3 J. Langemeyer, M.J. Latkowska, E.N. Gómez-Baggethun, *Ecosystem services from urban gardens*, in: S. Bell, R. Fox-Kämper, N. Keshavarz et al. (eds), *Urban allotment gardens in Europe*, London and New York 2016, pp. 115–141.

4 A. Speak, A. Mizgajski, J. Borysiak, *Allotment gardens and parks: Provision of ecosystem services with an emphasis on biodiversity*, "Urban Forestry and Urban Greening" 2015 no. 14, pp. 772–781.

5 M. Camps-Calvet, J. Langemeyer, L. Calvet-Mir, E. Gómez-Baggethun, *Ecosystem services provided by urban gardens in Barcelona, Spain: Insights for policy and planning*, "Environmental Science and Policy" 2016 no. 62, pp. 14–23.

6 S. Bell, R. Fox-Kämper, N. Keshavarz et al. (eds), *Urban allotment gardens in Europe*, London and New York 2016, p. 384.

lenges and Lessons Learned. Polish experience in this area can be particularly valuable as this is a country with the highest number of allotments sites in Europe in relation to population[7].

The existing research findings make it possible to conclude that cultural benefits are of key importance for UAGs holders and this importance has been growing recently.

Cultural benefits are inherent linked to their subjective perception by receivers, hence their different specification in publications. It would be of importance to adopt more or less uniform classification to increase the comparability of diverse studies. The aim of this paper is to present the set of CES provided by UAGs and to attribute the identified categories to the Common International Classification of Ecosystem Services (CICES).

Cultural benefits of UAG ecosystems as an object of research

According to the definition in the Millennium Ecosystem Assessment[8], cultural ecosystem services signify the psychosocial aspects of people-nature interactions. R. Russell et al.[9] reported that CES represent '*intangible dimensions of the links between people and ecosystems that are psychological, philosophical, social, and spiritual and are at the very core of human preferences and values*'. Cultural services constitute one of three sections in the CICES v.4.3[10]. While accepting this classification, one should notice the statement by K.M.A. Chan et al.[11] that most of cultural benefits are produced not only through cultural services but also through provisioning services. D. La Rosa et al.[12] emphasized that '*CES are directly experienced and appreciated by people through ecosystems, thus, unlike other services*'. Publications devoted to ecosystem services provided by UAGs[3,4,5,6] use various approaches to the classification of CES. From the point of view of the CES diagnosis, the ethno-

7 B. Wycichowska, *Przesądzona zmiana polityki państwa w zakresie ogrodnictwa działkowego*, "Przegląd Komunalny" 2013 no. 2, pp. 44–48.

8 *The Millennium Ecosystem Assessment, Ecosystems and Human Well-being: Biodiversity Synthesis*, Washington 2005.

9 R. Russell, A.D. Guerry, P. Balvanera et al., *Humans and nature: how knowing and experiencing nature affect well-being*, "Annual Reviews Environment and Resources" 2013 no. 38, pp. 473–502.

10 R. Haines-Young, M. Potschin, *CICES. Towards a common classification of ecosystem services. CICES v.4.3* (January 2013), www.cices.eu [28-09–2016].

11 K.M.A. Chan, T. Satterfield, J. Goldstein, *Rethinking ecosystem services to better address and navigate cultural values*, "Ecological Economics" 2012 no. 74, pp. 8–18.

12 D. La Rosa, M. Spyra, L. Inostroza, *Indicators of cultural ecosystem services for urban planning: A review*, "Ecological Indicators" 2016 no. 61, pp. 74–89.

graphic monograph[13] is particular valuable. It takes into account the main CES included into three groups of interactions between the person and the allotment garden, namely, physical, intellectual and spiritual ones. R. Shelton[14] presented motives that guided him in the arrangement of the plot in a personal account. A.E. van den Berg and M.H.G. Custers[15] indicated the importance of gardening for alleviating stress. M. Ferres and T.G. Townshend[16] have described the current benefits (social, health and well-being) and future opportunities of allotments in the UK. J. Breuste and M. Artmann[17] described the cultural benefits from allotmenteers' perspectives. A few CES from UAGs were characterized by J. Langemeyer et al.[3] Similar research was conducted in Barcelona[6]. Several papers concern the role of gardening activities in an individual's emotional, physical and spiritual renewal[18,19,20,21,22].

Study procedure

The paper presents the results on the identification of cultural benefits provided by UAGs. The investigations base on the expert knowledge of authors, own field study in Poznań's UAGs, scientific papers as well as publications addressed to a wide audience.

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13 M. Szczurek, M. Zych (eds), *Dzieło-działka*, Muzeum Etnograficzne im. Seweryna Udzieli w Krakowie 2012, Kraków, p. 382.

14 R. Shelton, *Allotted time, two blokes, one shed, no idea*, Robin Shelton 2006, p. 372.

15 A.E. van den Berg, M.H.G. Custers, *Gardening promotes neuroendocrine and affective restoration from stress*, "Journal of Health Psychology" 2011 no. 16, pp. 3–11.

16 M. Ferres, T.G. Townshend, *The social, health and well-being benefits of allotments: five societies in Newcastle*, "Global Urban Research Unit, Electronic Working Paper" 2012 no. 47, p. 47.

17 J. Breuste, M. Artmann, *Allotment garden contribute to urban ecosystem service: Case study Salzburg, Austria*, "Journal of Urban Planning and Development" 2015 no. 141(3), pp. 1–10.

18 N. Dunnett, M. Qasim, *Perceived benefits to human well being of urban gardens*, "Hort Technology" 2000 no. 10, pp. 40–45.

19 C. Milligan, A. Gatrell, A. Bingley, '*Cultivating health*': *therapeutic landscapes and older people in northern England*, "Social Science and Medicine" 2004 no. 58, pp. 1781–1793.

20 J.L. Hawkins, K.J. Thirlaway, K. Backx et al., *Allotment gardening and other leisure activities for stress reduction and healthy ageing*, "Hort Technology" 2011 no. 21, pp. 577–585.

21 S.A. Park, K.S. Lee, K.C. Son, *Determining exercise intensities of gardening tasks as a physical activity using metabolic equivalents in older adults*, "Hort Science" 2011 no. 46, pp. 1706–1710.

22 B. Kabiri, L. Balilan, *The analysis of the Iranian garden-therapy process based on the perceptual ecologic theory*, "Journal of Art and Architecture" 2015 no. 1, pp. 5–13.

The presented work follows the research on biodiversity (J. Borysiak et al.[1]) and study on ecosystem services (A. Speak et al.[5]) carried out for UAGs in Poznań. One part of that studies was a questionnaire interview completed by 110 allotment garden users with the help of the researchers. Some questions concerned gardeners opinion to the importance of CES. The results of discourses on CES with members of the management boards of 11 UAGs have been also considered as a significant source of knowledge. We analysed related records in garden chronicles. The identified cultural ecosystem services have been attributed to the Common International Classification of Ecosystem Services CICES v.4.3.

Cultural benefits of UAGs ecosystems

Sixty four cultural ecosystem services on the most detailed level 'class type' of the CICES v.4.3 were identified. They represent 2 divisions, 3 groups and 8 classes (table 1). Numbers of recognized services in the classes are very diverse. This reflects the different detailed perception of individual cultural benefits.

'Intellectual interactions' as the dominating group occurs in 45 class types of benefits clustered in 5 classes. Seeing urban allotment gardens as the subject of research is the largest class, which consists of 14 benefit class types. The class 'Allotment gardening heritage …' contains 12 class types. Similarly extended (10 benefits) is the class 'Enhancing and building family ties and relations with society …'. Former two classes in this group are less numerous: place of gaining and providing knowledge on the nature and allotmenteering (6) and objects of cultural creativity (3). The other smaller two groups: 'Physical and experiential interactions' and 'Spiritual interactions' comprise respectively 10 and 9 class types.

While the table 1 reflects a general state of knowledge, the table 2 illustrates the spread of users real opinions concerning the significance of some CES provided by UAGs in Poznań.

Discussion of results

One of the CES groups provided by UAGs is the physical and experiential interactions between the allotment garden holder and the used ecosystem. Mostly activities performed at the plot are treated as the source of recreation: composting, cutting trees and shrubs, digging, fertilizing, harvesting and processing fruits or vegetables, mowing, raking, sowing and planting, watering,

weeding, and also 'do-it-yourself' tasks. They are a simple way of harnessing the healing power of nature and an opportunity for an individual's emotional, physical and spiritual renewal. Hawkins et al.[20] found that allotment gardeners showed significantly lower stress level than other urban inhabitants, who only performed indoor activities. Similarly, A.E. van den Berg and M.H.G. Custers[15] reported that passive relaxation releases the stress more slowly than working in one's allotment. The mental health benefits from private gardens are highly appreciated by people[18]. Fifty percent of allotmenteers in Salzburg would like to reduce the maintenance gardening to have more time to relax[23].

Physical activities in gardens help to fight the dementia syndrome[24]. J.N. Davis et al.[25] documented a positive influence on blood pressure, cholesterol synthesis and body mass. Regular gardening is effective in improving diabetes care[26]. J. Langemeyer et al.[3] quoted the results of study by A. Taylor et al., which document healthy child development under the influence of contact with nature. J.L. Hawkins et al.[20] and S.A. Park et al.[21] concluded that gardening is an excellent motivation to undertake physical activities by older adults. C. Milligan et al.[19] demonstrated that the positive influence of gardening on the quality of life and emotional well-being of older people is greater when these activities are performed in allotments than in home gardens. Such actions in communal gardening sites are called the cultivation of 'therapeutic landscape'[22]. As many as 99% allotmenteers in Poznań found physical well-being benefits to be very important for them (table 2), while psychological well-being benefits were important for 95%. The demographic burden ratio in Poznań increases dynamically, which means society's ageing and an increased demand for healthcare services[27]. Such a demographic change exposes the role of allotmenteering for older adults as a way to actively spend time.

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23 J.H. Breuste, M. Artmann, *Cultural benefits from allotment gardens in Salzburg, Austria*, in: S. Bell, R. Fox-Kämper, N. Keshavarz et al. (eds), *Urban allotment gardens in Europe*, London and New York 2016, pp. 133–134.

24 D. Gębka, K. Kędziora-Kornatowska, M. Podhorecka et al., *Activation of the elderly with dementia syndrome,* "Medical and Biological Sciences" 2015 no. 29, pp. 5–9.

25 J.N. Davis, E.E. Ventura, L.T. Cook et al., *LA Sprouts: A gardening, nutrition, and cooking intervention for Latino youth improves diet and reduces obesity*, "Journal of the American Dietetic Association" 2011 no. 111, pp. 1224–1230.

26 D.L. Armstrong, *A community diabetes education and gardening project to improve diabetes care in a Northwest American Indian tribe*, "Diabetes Educator" 2000 no. 26, pp. 113–120.

27 T. Kaczmarek, M. Walaszek, *4.1. Rozmieszczenie, dynamika i struktura ludności*, in: T. Kaczmarek (ed.), *Koncepcja kierunków rozwoju przestrzennego metropolii Poznań*, Poznań 2015, pp. 63–85.

The level of social cohesion is also related to CES provided by UAGs. Such a social contacts are stronger in Polish than in Austrian AGs[23]. For example (table 2), problems connected with cultivating plants are solved by Poznań allotment holders by looking for help from other allotment users (72% of respondents, including 66% from others gardeners in the same UAGs estate) more often than by searching in specialist publications (24%). Some people (28%) gained knowledge from older family members. A significant part of respondents (42%) gained knowledge through their own experience. Advice was sought from gardening specialists of the UAG District Management only occasionally (4%). In Salzburg, only a half of those surveyed (48%) learned gardening from other gardeners, but they used published information more often[23]. The majority of Poznań gardeners (68%) concluded that allotmenteering requires continuous learning. S. Barthel et al.[28] found that the allotment gardens function as communities-of-practice. Knowledge in allotment gardens are retained and transmitted by imitation of practices, oral communication and collective rituals and habits.

Conclusions

The analysis conducted, systematizes the knowledge about cultural ecosystem services provided by UAGs. The frequent practise of using the CICES as a framework motivated authors to apply it for ordering cultural benefits for people resulting from processes and functions of allotment gardens. Considering that CICES is a general classification, an adjustment to this specific type of urban ecosystem has been implemented.

The completed catalogue of UAGs' CES facilitates to compare the results of studies from different cities with various social-ecological conditions. One can see the presented approach as a reference point for other inventories of cultural services provided by various types of urban ecosystems.

[28] S. Barthel, C. Folke, J. Colding, *Social-ecological memory in urban gardens-Retaining the capacity for management of ecosystem services*, "Global Environmental Change" 2010 no. 20, pp. 255–265.

Table 1. Cultural services provided by urban allotment garden ecosystems

Section	Division	Group	Class	Class type
Cultural services	Physical and intellectual interactions	Physical and experiential interactions	Physical experience of the nature of an allotment garden in situ	Physical experience of: [13,14; and authors' recognition] 1. natural rhythms of nature and their manifestations in the condition of cultivated plants and spontaneous vegetation 2. climate change and its consequences visible in the habits of plant cultivation 3. developmental biology of cultivated plants and spontaneous flora species 4. biodiversity of fauna and flora 5. developmental biology of oppressive weeds 6. developmental biology of cultivation pests and the damage caused 7. taste and nutritional values of cultivated fruits and vegetables
			Using the nature of an allotment garden for recreation: physical and mental, individual and collection, intensive and relaxation	Recreation by: [13,15,23,29,30,31; and authors' recognition] 8. physical activity during gardening: digging, watering, weeding etc. 9. physical activity during: competitions, dances, games, festivals etc. 10. relaxation while: contemplating nature, walking etc.
		Intellectual interactions	Allotment gardens as an object of scientific research	Scientific subjects in publications:[1,28,30,31,32,33,34,35,36,37,38,39] 11. biology and autecology of flora and fauna species

29 E. Duś, *Recreational use and health functions of allotments gardens in the Katowice conurbation,* Poland, "Environmental and Socio-economic Studies" 2014 no. 2.2, pp. 16–25.

30 R. Szkup, *Użytkowanie rodzinnych ogrodów działkowych (ROD) przez społeczność wielkomiejską*, Łódź 2013.

31 A. Adamczewska, J. Janowska, *Występowanie zagrożonych gatunków flory segetalnej na terenie pracowniczych ogrodów działkowych w północnej części Łodzi, "*Acta Universitatis Lodziensis" 1998 no. 13, pp. 165–168.

32 W. Biaduń, *Winter avifauna of Lublin – species composition, distribution and numbers,* "Berkut" 2005 no. 14, pp. 1–23.

33 E. Andersson, S. Barthel, K. Ahrné, *Measuring social-ecological dynamics behind the generation of ecosystem services*, "Ecological Applications" 2007 no. 17, pp. 1267–1278.

34 E. Domene, D. Sauri, *Urbanization and class-produced natures: Vegetable gardens in the Barcelona Metropolitan Region*, "Geoforum" 2007 no. 38, pp. 287–298.

35 D. Figurska-Ciura, K. Łoźna, M. Styczyńska*, Cadmium, lead, zinc and copper contents in selected vegetables and fruit from garden allotments of the South-Western Poland,* "Polish Journal of Food and Nutrition Sciences" 2007 no. 57, pp. 137–143.

36 A.E. van den Berg, M. van Winsum-Westra, *Manicured, romantic, or wild? The relation between need for structure and preferences for garden styles,* "Urban Forestry and Urban Greening" 2010 no. 9, pp. 179–186.

37 A.E. van den Berg, M. van Winsum-Westra, S. de Vries, S.M.E. van Dillen, *Allotment gardening and health: a comparative survey among allotment gardeners and their neighbors without an allotment,* "Environmental Health" 2010 no. 9: 74.

38 R.S. Matos, D.S. Batista, *Urban agriculture: the allotment garden as structures of urban sustainability,* "Advances in Landscape Architecture" 2013, http://dx.doi.org/10.5772/55892. [03–10–2016]

39 B.B. Lin, S.M. Philpott, S. Jha, *The future of urban agriculture and biodiversity-ecosystem services: Challenges and next steps,* "Basic and Applied Ecology" 2015 no. 16, pp. 189–201.

Section	Division	Group	Class	Class type
				12. biodiversity of fauna and flora 13. invasive plant and animal species 14. agrodiversity as a genetic resource of cultivation plants 15. physicochemical properties of soils, fertilization and yields of cultivations 16. fighting weeds in cultivations 17. protection of cultivations against pests 18. architecture of plots 19. position in urban green infrastructure and spatial planning 20. the influence on the state of human health 21. importance for education 22. role in social cohesion 23. historiography 24. cultural heritage
			Gaining and providing knowledge on the nature of allotment gardens and allotment gardening	Scope of education:[14,15; and authors' recognition] 25. biodiversity of fauna and flora 26. functioning of the natural environment 27. conditions of plant cultivation 28. methods and skills of plant cultivation 29. techniques of fighting weeds and animal pests 30. design plant composition according to the nature of the habitat
			Allotment gardening heritage: of materials, ideals, customs and social behaviours	Heritage of allotment gardening:[30,40,41,42,43,44,45,46,47; and authors' recognition] 31. a complex of family allotment gardens, as a historically-shaped type of urban agriculture landscape and urban green infrastructure 32. long-term development of the allotments network which constitutes a part of the historical urban layout 33. a nearly 100-year-old allotmenteering tradition – a part of the city›s historical identity and its tradition 34. heritage of natural biosphere resources

40 C. DeSilvey, *Cultivated histories in a Scottish allotment garden,* "Cultural Geographies" 2003 no. 10, pp. 442–468.

41 A. Rubino, *The allotment gardens of the Ile de France: a tool for social development,* "Journal of Mediterranean Ecology" 2007 no. 8, pp. 67–75.

42 A. Smrekar, *Allotment keeping in Ljubljana,* "Geographia Polonica" 2009 no. 82, p. 69–86.

43 A. Pawlikowska-Piechotka, *Tradycja ogrodów działkowych w Polsce*, Gdynia 2010.

44 L. Acton, *Allotment Gardens: A Reflection of History, Heritage, Community and Self*, "PIA" 2011 no. 21, pp. 46–58.

45 M. Lorbek, M. Martinsen, *Allotment Garden Dwellings: Exploring Tradition and Legal Framework,* "Urbani izziv" 2015 no. 26 (special issue).

46 J. Spilková, J. Vágner, *The loss of land devoted to allotment gardening: The context of the contrasting pressures of urban planning, public and private interests in Prague, Czechia,* "Land Use Policy" 2016 no. 52, pp. 232–239.

47 M. Drilling, R. Giedych, L. Poniży, *The idea of allotment gardens and the role of spatial and urban planning,* in: S. Bell, R. Fox-Kämper, N. Keshavarz et al. (eds), *Urban allotment gardens in Europe*, London and New York 2016, pp. 35–61.

Section	Division	Group	Class	Class type
				35. multi-generation knowledge about biodiversity of the flora and fauna and the functioning of the natural environment 36. heritage of the cultivation methods of vegetables, fruits and ornamental plants developed by several generations, and also the heritage of rituals 37. refuge for gene plant resources – ancient cultivars of: fruit trees, shrubs and vegetables 38. a symbol of social cohesion 39. *genius loci* in memories and reminiscences of events 40. chronicles of UAGs estates 41. a hall of fame of distinguished activists in the UAGs sector 42. recording the history of UAGs in legal acts
			Culture-forming role of allotment gardening	Culture-forming interactions:[14, and authors' recognition] 43. development of the art of allotment gardening 44. development of culinary culture – creation of recipes for food processing keeping visual, flavour and nutritious characteristics of fruits and vegetables from the allotment garden 45. organising allotment gardens with an artistic style increasing the aesthetics of the urban landscape
			Enhancing and building family ties and relations with society based on interactions with the nature of the allotment garden	Activity for social integration:[19,21,48; and authors' recognition] 46. common garden management and gardening 47. mutual education in the art of allotment gardening 48. sharing knowledge about biodiversity of the flora and fauna and the functioning of the nature 49. joint recreation 50. participation in family ceremonies and ceremonies for the local community 51. economic assistance in the form of donating fruits and vegetables 52. making UAGs available for the local community 53. organisation of harvest exhibitions (vegetables, fruits, ornamental plants), gardening courses, artistic workshops, lectures on healthy lifestyle 54. organisation of public space for recreation with special attention paid to the youngest generation and the elderly 55. conducting the so-called green schools for formal education entities

48 J. Śniadek, A. Zajadacz, *Senior citizens and their leisure activity: understanding leisure behaviour of elderly people in Poland,* "Studies in Physical Culture and Tourism" 2010 no. 17, pp. 193–204.

Section	Division	Group	Class	Class type
	Spiritual and symbolic interactions	Spiritual interactions	Spiritual states related to allotment gardening	Expression of spiritual states:[14,18,20; and authors' recognition] 56. biophilia – positive, emotional reactions to allotment garden nature 57. cheerfulness resulting from physical well-being, psychological well-being and social well-being 58. satisfaction from success in life in the emotional and affiliative dimension, strengthening family relations and establishing social relations with other people 59. no fear of social exclusion – for elderly people, long-term unemployed people, poor people, single mothers etc. 60. satisfaction from self-fulfilment: fulfilling one›s dreams, achievement of the assumed goal, fulfilling ambitions, doing hobby, fully used free time, healthy lifestyle, intellectual and spiritual development 61. a sense of food security resulting from the production of cheap and healthy food processed on one's own 62. reflection on periodicity, change and transience of life 63. responsibility for continuation of allotment gardening traditions and keeping allotment gardens in green infrastructure of the city 64. acceptance of UAGs estate management board initiatives that meet the needs of the local community

Table 2. Significances of cultural benefits from urban allotment gardens based on opinions from a questionnaire interview with allotment gardeners

	% (from 110 respondents)	Average value [a)]
KNOWLEDGE OF BIODIVERSITY IN ALLOTMENT GARDENS		
– recognition of the majority of weeds and pests without knowing names of plant and animal	94	
– plants and animals known by their names and taxonomy	8	
GAINING KNOWLEDGE ABOUT PLANT CULTIVATION		
– from one's own experience	42	
– from an older member of the family, allotment user	28	
– obtaining information from another allotment user from the same UAGS estate or from outside/only from the same UAGs estate	72/66	
– from scientific and popular science articles	24	
– consultations with a specialist from UAGs estate management board	4	
– seldom/on a regular basis	32/68	
SOCIAL COHESION		
– exchanging plant material with neighbours	94	
– neighbourly help in gardening work	26	
– family meetings at the allotments	87	
– participation in meetings at the allotments with society outside the UAGs estate	2	
IMPORTANCE OF THE ALLOTMENT GARDEN FOR ITS USER		
– physical well-being benefits	99	1.5
– psychological well-being benefits	95	1.8
– social well-being benefits	97	1.3

a) 0 – not important, 1 – important, 2 – highly important

The contribution of the authors in the article

Prof. Janina Borysiak, Ph.D – 70%

Prof. Andrzej Mizgajski, Ph.D – 30%

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