

Original Article**Designing a Complex Agricultural System for Small Land Surfaces****Maria Manuela CRISTA*, Adalbert ÖKRÖS***University of Agricultural Sciences and Veterinary Medicine of Banat "King Michael the 1st of Romania" from Timișoara, Calea Aradului 119, Timișoara 300645, Timișoara, Romania*Received 2 June 2017; received and revised form 25 August 2017; accepted 1 September 2017
Available online 30 September 2017

Abstract

The purpose of this scientific paper is to present a complex agricultural system on a small land surface. The paper presents the general cultivation technology of a vegetable basket, which covers the weekly necessity, as well as production costs and incomes. This agricultural system may be exploited by small farmers who own a reduced land surface, of approximately 1 ha, which will insure his daily bread. The objectives of this system are those covering the food necessity by means of the plants cultivated through crop rotation, the works necessary for soil preparation and plant development after the adapting to the conditions of the natural environment. The following materials and research methods were taken into account: soil quality, field observations, and costs with crop cultivation, their maintenance and capitalization.

Key words: agricultural system, small farms, crop.

1. Introduction

Agriculture is the field which deals with the production of vegetal and animal food, fibres, respectively useful materials through the cultivation of certain plants and animal breeding. In agriculture, depending on the technology used, specialization level, biomass quantity and quality, the relations with the environment, various agricultural systems are practiced:

- conventional,
- extensive,
- sustainable,
- biologic,
- organic,
- precision.

Today, more and more accent is placed on vegetable cultivation, since they bring a substantial income per surface unit.

For many agriculturist it is difficult to start a business in a field where the main products obtained are cereals, because material base and equipment and land acquisition costs are very high, and they do not possess the financial power to supplement the sums necessary to access various European fund projects, where the farmer's share ranges from 25 to 30%. [3]

Thus, within the system presented in this paper, crop cultivation and maintenance expenses are a lot smaller, the income is higher, but it means greater amount of force and labour for the farmer. The purpose of this paper, is to present a complex agricultural system on a small land surface. It lays forth the general cultivation works and technology for a vegetable basket covering the weekly necessity.

The present day alert lifestyle does not allow many citizens to get regular vegetable supplies from markets and supermarkets. This weekly basket comes to support them with fresh quality products, delivered straight to their house. [4]

* Corresponding author.
Tel: +40-256-277-009
Fax: +40-256-277-122
e-mail:manuelacrista@yahoo.com

2. Material and Method

The land surface aimed for plant cultivation is of 1 hectare.

On this surface, several species of plants will be cultivated, enough to cover the needs of a small farmer, who shall live off the cultivated surface.

The plants to be cultivated are: lettuce, spinach, onion, garlic, potatoes, dill, parsley, carrots, parsnip, celery, tomatoes, green peppers, chilly peppers, piment, eggplants, beans, peas, cucumber, pumpkin, sweet corn and beet.

Plants that are to be cultivated have been selected in such a way as to satisfy a wide range for men's necessity regarding a satisfactory daily basket.

By a daily basket one understands the vegetable quantity covering a family's food necessity. Thus, even if the land surface is not large, the small farmer will have a profit.

Cultivated Plants:

- Dill (*Anethum graveolens*)
- Spinach (*Spinacea oleracea*)
- Onion (*Allium cepa*)
- Lettuce (*Lactuca sativa*)
- Radishes (*Raphanussativum*)
- Red beet (*Beta vulgaris*)
- Sweet corn (*Zea mays*)
- Cucumbers (*Cucumissativus*)
- Tomatoes (*Solanum lycopersicum*)
- Carrots (*Daucus carota*)
- Parsnip (*Pastinacasativa*)
- Parsley (*Petroselinum crispum*)
- Celery (*Apiumgraveolens*)
- Green pepper (*Capsicum annuum*)
- Potatoes (*Solanum tuberosum*)

The plants will be cultivated on surface of 0.9 ha in crop rotation, taking into account the previous plot.

3. Results and Discussions

The pattern of previously described plants is presented in Table 1.

The means for seed preparation are mechanical, seeding being performed manually in most cases, except for with sweet corn and potatoes where seeding, respectively planting is performed mechanically. [6]

The necessary labour force was insured by a family of three, plus daymen. Plant harvesting is carried out in instalments, depending on the orders to be met, many orders being subscription based.

Crop irrigation is carried out using water from great depth drillings. Table 2 shows data obtained after applying the calculation method presented as follows.

Dill: we need 60 g seed, and on the cultivated surface, we obtain 15 kg dill leaf + dry stem, 1 bunch weighing 5 g.

Spinach: we need 60 g seed, and on a cultivated surface we obtain 270 kg at a price of 1.2 lei.

Spring onions: we need 20 de kg chives, and on the cultivated surfaces we obtain 1600 bunches, where 1 bunch = 8 onions = 1.5 lei.

Lettuce: we need 30 g seed, and on the cultivated surfaces we obtain 3000 plants, a plant amounting to 1 lei.

Radishes: we need 20 g seed, which result in 300 kg radishes, and 1 kg = 5 lei.

Autumn onion: we need 30 kg chives, and on the cultivated surfaces we obtain 1000 kg onion, at a price of 2.5 lei.

Red beet: we need 560 gram seed, and on the cultivated surfaces we obtain 1200 kg, 1 kg red beet equalling 2.5 lei.

Sweet corn: we need 11000 grains, which produce 11000 corn cobs, where 1 cob amounts to a price of 1 lei respectively 0.5 lei.

Cucumbers: we need 2000 seeds, and the number of plants being of 2000 plants per cultivated surface, with 1 kg = 3 lei, the production amounting to 2000 kg, one plant = 1 kg cucumbers.

Tomatoes: we need 20 g seed, 5000 plants being necessary per planted surface, 1 plant producing 5 kg tomatoes.

Carrots: we need 50 g seed, and on the cultivated surfaces we obtain 1500 kg, a kg amounting to 2 lei.

Parsnip: we need 10 g, the production being of 300 kg, one kg amounting to 3 lei.

Parsley: we need 50 g seed, and on the cultivated surfaces we obtain 900 de kg, at a price of 2.5 lei/kg.

Celery: we need 70 g seminte, achieving a production of 430 de kg and 50 bunches, with 3 lei/kg and 1 lei = one bunch.

Pepper: we need 4000 seed, obtaining 2000 kg per cultivated surface.

Potatoes: we need 600 kg de tuberculi, achieving a production of 3000 kg, a kg at the price of 1.80 lei.

Table 1. Crop cultivation pattern

S1 = 1,000 m ²	S2 = 1,000 m ²	S3 = 2,000 m ²
-dill (100 m ²); -spinach (300 m ²); -spring onions (200 m ²); -lettuce (200 m ²); -radish (200 m ²).	-autumn (red, white, yellow)(500m ²); -beet (400m ²). -celery (100 m ²).	-sweet corn.
S4 = 1,000 m ²	S5 = 1,000 m ²	S6 = 1,000 m ²
-cucumbers (100 m ²); -tomatoes (900 m ²).	-carrots (500 m ²); -parsnip (100 m ²) -parsley(rootandleaf)(400 m ²);	-peppers (1000 m ²);
S7 = 2,000 m ²		
-potatoes (1000 m ²).		

Table 2. Production cost calculation and crop profit

Plant	Surface m ²	Crop costs(seed+works)	cultivation costs	Maintenance costs	Productions obtained	Income	Expenses	Profit
Dill	100 m ²	30lei+200 lei		200 lei	15kg dill leaf + drystem	3,430	430 lei	3000 lei
Spinach	300 m ²	15lei+100 lei		100 lei	270 kg	539	215 lei	324lei
Spring onion	200 m ²	200lei+100 lei		200 lei	1600 plants	1,500	500 lei	1000lei
Lettuce	200 m ²	300 lei+100lei		300 lei	3000 plants	3,700	700 lei	3000lei
Radishes	200 m ²	100 lei+200 lei		300 lei	300 kg	2,100	600 lei	1500
Autumn onion	500 m ²	300 lei+200 lei		150 lei	1000 kg	3,150	650 lei	2500
Red beet	400 m ²	240 lei+200 lei		150 lei	1200 kg	2,490	590 lei	2400 lei
Celery	100 m ²	350 lei+100 lei		100 lei	430 kg, 50 bunches	1,950	550 lei	1400 lei
Sweet corn	2000 m ²	750 lei+700 lei		200 lei	1100 plants	9,150	1650 lei	7500lei
Cucumbers	100 m ²	280 lei+200 lei		200 lei	500 plants	2,180	680 lei	1500
Tomatoes	1000 m ²	150 lei+300 lei		600 lei	5000 plants	51,050	1050 lei	50000lei
Carrots	500 m ²	100 lei+200 lei		250 lei	1500 kg	3,550	550 lei	3000 lei
Parsnip	100 m ²	20 lei+100 lei		250 lei	300 kg	1,270	370 lei	900 lei
Parsley	300 m ²	40 lei+200 lei		250 lei	900 kg	2,740	490 lei	2250 lei
Pepper	1000 m ²	500 lei+ 300 lei		300 lei	2000 kg	7,100	1100 lei	6000 lei-
Potatoes	2000 m ²	600 lei+400 lei		500 lei	3000 kg	4,500	1500 lei	3000lei
TOTAL	0.9 ha	7575 lei		4050 lei		94,999	11625lei	87874 lei

4. Conclusions

The most profitable agricultural crops can come on small surfaces, for those owning a small land surface, of one, two or three hectares, the profit potential being substantial, when taking into account the fact that a part of the harvest may be processed, thus increasing the profit and reducing chances of loss.

The aquired profit insures a decent living for the family, with the possibility of further business development by accessing non-refundable

funds for the acquisition of tools and equipment, necessary for crop cultivation and maintenance, such as monocultivator, atomizer.

Product distribution is undertaken weekly to clients, each one benefitting from a wide range of products, according to their requirements and necessities.

The entire family can asociate with fruit, milk and pork and fowl producers, final consumers benefitting from the safty and quality of homestead products.

References

- [1] Niță S., A. Okros, 2012, Agricultural Systems Editura Eurobit Timișoara. [In Romanian].
- [2] Nita S., V. Tabara, G. David, L. Nita, L. Dumitru, A. Simion, M. Dragos, A. Borcean, 2012, Results obtained for soybean, pea and lentils crops on a cambic chernozem in the Banat's plain during 2008-2010, Romanian agricultural research, 29, 155-162.
- [3] Okros A., G. Pop, A. Lațo, A.S. Groszler, A. Berbecea, I. Radulov, C. Mihuț, L.D. Niță, S. Niță, 2015, Designing an agricultural system in the Seleuș locality, Arad county, Research Journal of Agricultural vol. 47(1), 124-127
- [4] Okros A., Georgeta Pop, Alina Lațo, Astrid-Simone Groszler, Adina Berbecea, Isidora Radulov, Casiana Mihuț, L. D. Niță, Simona Niță, T. Florescu, 2015, The agricultural system in the Nițchidorf locality areal, Timiș county, Research Journal of Agricultural vol. 47 (1), 120-124.
- [5] Niță L, I. Rusu, V. Ștefan, Anthropoc activity effect on cambic chernozem density in timișoara. Lucrări Științifice-Agricultură, Universitatea de Științe Agricole și Medicină Veterinară a Banatului Timișoara, 32(1), 181-188,
- [6] Okros A., G. POP, S. NIȚĂ, L.D. NIȚĂ, L. BOTOȘ, 2015, The agriculture system from the Sânpetru Mare commune, Timiș County, Lucrări Științifice, Agronomie, 58, 139-142
- [7] Ökrös A., S. Niță, C. Mihuț, E. Kocis, A. Duma Copcea, 2014, The Agricultural System from the Șagu village Area, Arad County, Review on Agriculture and Rural Development Scientific Journal of the University of Szeged, Faculty of Agriculture, 1(3), 105-110.
- [8] Ökrös A., S. Niță, C. Mihuț, E. Kocis, A. Duma Copcea, 2014, 2014, Agritourism in the Danube gorge, Review on Agriculture and rural development Scientific Journal of the University of Szeged, Faculty of Agriculture, 1(3), 111-115.

"This is an open-access article distributed under the terms of the Creative Commons Attribution License, which permits unrestricted use, distribution and reproduction in any medium, provided the original author and source are credited."