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7. «Ключові особливості інноваційної політики як основи для розробки заходів з посилення інновацій, що сприятимуть наближенню України до конкурентної економіки знань-порівняння ЄС та України» Витяг з аналітичної роботи проекту ЄС «Вдосконалення стратегій, політики та регулювання інновацій в Україні» за редакцією Гудрун Румф / Джорджа Строгілопулоса / Ігора Єгорова. – К.: Фенікс, 2011 – 99 с.

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4.5 Agroecological fundamentals of creation of artificial phytocenoses of energy crops for recultivation

The constant development of scientific and technological progress, especially nowadays, leads to a significant transformation of natural landscapes. A rapid production increase, a sharp growth of the urban population resulted in the formation of urban territories. Industrial, transport and other engineering structures are concentrated in these territories. The different types of disturbed lands, which lost their properties, were formed as a result of the operation of energy and industrial facilities. To accelerate the process of restoration of damaged objects, it is necessary to carry out biological recultivation. It will improve conditions in their areas. In this regard, researches aimed at theoretical and experimental substantiation and development of technologies for biological recultivation of disturbed lands with the use of plants are becoming especially relevant. Agroecological substantiation and implementation of various agro-technological operations for growing energy crops on marginal lands are becoming important. The use of energy crops biomass as vegetable raw materials for the production of biofuels is of high-priority importance. This implies a reduction in the energy dependence of the country as a whole, and of territorial communities in particular. In addition, the content of organic matter in the soil has been increased, the water balance of soil profile and the carbon circulation in it have been improved for the long-term cultivation of energy crops [1-3.].

Today, a source material of energy crops for breeding is being studied [4], agrobiological features of yield formation and quality of switchgrass seed are being investigated [5], biomass potential for a certain region is being examined [6], ways of using energy crop biomass for production of biofuels are being substantiated, methods of their production and energy conversion are being developed [7, 8].

Nowadays, special attention should be paid to issues related to the use of land affected by man-made impacts, the possibility of using edophytes to clean production areas [9], their recultivation and soil purification by energy crops [10].

In order to create artificial phytocenoses, the features of natural undisturbed landscapes should be studied at the first stage, followed by the selection of promising plant species, in order to use them as components for phytomelioration. The experiments carried out by the authors [9, 11] has determined that in the conditions of heavy metal pollution of CHPs (combined heat and power plant), a small group of species of the families *Poaceae*, *Asteraceae* and *Apiaceae* occupied the leading positions. Plants from these families are highly resistant to heavy metals. A mixture of Columbus grass (*Sorghum almum parodi*) and sainfoin (English name – Sainfoin) showed one of the best indicators in the phytocenosis restoration.

In order to determine movement of heavy metals in plant organs, various plants were studied on the basis of the floristic analysis. These plants are representatives of two families: cocksfoot or rye grass (*Dáctylis glomeráta*) (family *Poaceae*) and dandelion (family *Asteraceae*). The authors' findings [12], has proved that plants of both species were characterized by a high composition of manganese, zinc and copper in the root system and shoots. The difference between these plants was the following: the concentration of metals in the roots of cocksfoot was much higher (2.5–10 times) than in the roots of dandelion on all plots. The content of heavy metals in plant shoots differed to a lesser extent. The content of all metals in the underground organs of cocksfoot (*Dáctylis glomeráta*) exceeded their content in the shoots by 20 – 24 times, which indicates a well-defined barrier function of the root system [9, 13].

Other experiments have shown that plants of the family *Poaceae*, which grow in natural phytocenoses, on radiation-contaminated soils, have fitoremediation properties [14]. It has been determined that transfer factor of metals exceeds the limiting force for the plants of *Miscanthus sinensis L*. Positive dynamics was found for the elements Co, Mn and Cr, which confirms the high ability of plants to accumulate ions of heavy metal in the vegetative organs [15].

Energy crops that can be suitable for the restoration of phytocenoses have been identified as follows: switchgrass, miscanthus giganteus, sorghum crops, etc. [16].

Foreign scientists have found that switchgrass is suitable to be grown on marginal lands [17]. It has relatively low needs for water and nutrients, and has positive environmental benefits as well (Sanderson et al. 1996; Vogel 2004) [18, 19].

Cultivation of grass mixtures along with monocrop plantations are perspective issues to be considered. Which involves the cultivation of the following energy crops: switchgrass (*Panicum virgatum L.*), perennial sorghum or Columbus grass (*Sorghum Almum Parodi*), as well as Big Bluestem (*Andropogon Gerardii Vitman*), *Sorghastrum nutans* or *Indiangrass* (*Sorghastrum nutans (L.) Nash*) [20]. These crops can also grow on marginal lands in the climatic conditions similar to Ukraine, and, accordingly, can be cultivated in our country.

The possibility of cultivating the above-mentioned plants, today, is confirmed by researches. For example, *Sorgastrum Nutans (Nash) L*. showed a high adaptive potential in the steppe of Ukraine. The plant from the second year of life, actively accumulates underground and aboveground biomass and reaches a maximum at the end of the third year. The yield of vegetative biomass is up to 15.0 t/ha [21]. This thesis is also confirmed by the authors' own experience of growing Indiangrass in the Forest-Steppe of Ukraine.

The patent search allowed the authors to find out the effectiveness of combined and mixed sowing of switchgrass (*Panicum virgatum L.)* with clover (*Trifolium pratense L.)* in Ukraine. The positive effect of the switchgrass cultivation method on the organic matter content in the soil and biomass yield has been determined. In companion crops, clover is grown for 3-4 years, until the loss of legumes, while the aboveground vegetative mass of clover performs a protective function, preventing the germination of weeds and creating a "bioherbicide screen" in switchgrass row-spacings. During these years of cultivation, legumes with the help of nodule bacteria of the root system accumulate nitrogen in the soil, using it for their own needs, as well as for the growth and development of switchgrass plants. Aftereffect of legumes is observed for 2-3 years in the future. In general, a dynamics of growth of organic matter content in the soil and an increase in the yield of switchgrass dry biomass are observed in switchgrass companion crops, compared to single-species crops [22].

According to the researches of M. I. Kulyk and S. M. Kosenko, it has been found that the yield of dry biomass was the highest under combined cultivation of miscanthus giganteus with lupine (12.2 t/ha). This yield is 2.9 t/ha higher compared to single-species plantations, 2.4 t/ha higher than cultivation with clover and 3.5 t/ha higher than variants with alfalfa [23].

Other researches show the effectiveness of switchgrass growing (*Panicum virgatum L.*) with lupine, and their impact on soil organic matter and biomass yield of the main component [24].

Our results are in full agreement with the previous studies of A. J. Ashworth, at all. [25], which claim a positive dynamics of increasing the sustainability of production of feed and biomaterials under combined cultivation of switchgrass with red clover (*Trifolium pratense L.*), hairy vetch (*Vicia villosa L.*), perennial clover (*Trifolium repens L.*), clover (*Trifolium vesiculosum L.*) and other legumes.

Foreign authors: Eric K. Anderson, Germán A. Bollero, W Matthew and others after field experiment obtained the reliable results that indicate an increase in economic profitability and effectiveness of combined cultivation of switchgrass with corn. That provides the improvement of economic effectiveness of switchgrass biomass production [26].

Here is a description of rare herbaceous energy crops for phytoremediation and restoration of phytocenosis in Ukraine.

Indiangrass (*Sorghastrum nutans (L.) Nash)* [27] is a natural perennial plant used to reduce erosion, for landscaping; provides food and shelter for wild animals. The plant is a warm season grain crop in the high-grass prairie ecosystem of North America. The natural habitat of plants is open fields and meadows. Indiangrass plants are adapted to the soils with deep moisture occurrence, ranging from heavy loamy and loamy sands with a pH range of 4.8 to 8.0. *Sorghastrum nutans* is moderately resistant to salinity and drought, adapted to periodic burning and survives by sprouting from underground rhizomes (rhizome). Plant height is 1.8–3.2 m; the minimum depth of root penetration is 60 – 70 cm. Biomass yield is 12 – 15 t/ha. Seeding rates for natural conditions are 4 – 5 kg/ha; seeding rates in a mixture are 10 – 50%, about 350,000 seeds per 1 kg. The number of years of cultivation on the plot is up to 15; the number of years to the maximum biomass yield from 1 ha is 3. This plant can become invasive in some regions or habitats and can displace the desired vegetation unless managed properly.

Big Bluestem *(Andropogon gerardii Vitman)* is a herbaceous perennial plant. It is used to reduce soil erosion, grows in sand and gravel quarries, in mountain quarries and along the roadsides. Big Bluestem is used as a raw material for the production of biofuels and as a quality feed for livestock. This plant also contributes to the biodiversity improvement [28].

Big Bluestem is one of the most common species in the high-grass prairie ecosystem of North America. The natural habitat of Big Bluestem phytocenoses is open fields and meadows. Plant height is 1.8 – 2.5 m; minimum depth of root penetration is 50 cm. Plant is resistant to a wide range of soil conditions and humidity levels and also characterized by high drought resistance as well as moderate salt resistance. Seeding rates for natural conditions are 4.5 – 6 kg/ha; seeding rates in a mixture are 10 – 50%, about 288,000 seeds per 1 kg. Biomass yield is 10 – 12 t/ha. The number of years of cultivation on the plot is 12 – 14; the number of years to the maximum biomass yield from 1 ha is 3.

Big Bluestem grown on biofuels should be harvested in autumn in order to minimize the loss of dry biomass, as it often lodges over the winter. Some studies have shown that Big Bluestem biomass has less ash content than other specialized energy crops [29–31].

Perennial sorghum (*Columbus Grass, Colghus almum Parodi*) is characterized by a high yield of biomass and seed, frost resistance and the proven cultivation technology [32].

Plant height is 2.8–3.5 m; minimum depth of root penetration is 70 – 80 cm; high drought resistance; moderate salt resistance. Seeding rates for natural conditions are 8.5 – 10 kg/ha; seeding rates in a mixture have not been studied. Biomass yield is 18 – 20 t/ha. The number of years of cultivation on the plot is up to 7; number of years to the maximum biomass yield from 1 ha is 2[33].

Paulownia is now considered as an energy crop in addition to other herbaceous bioenergy crops. The results of researches conducted in Russia [34] indicate that the plants of royal Paulownia (*Paulównia tomentósa*) are able to accumulate a lot of microelements such as manganese, lead, barium, selenium, cesium, arsenic in the wood. Apart from heavy metals, Paulownia is able to accumulate radionuclides (in mg per 1 kg of dry matter): radium – 226, thorium – 232 and potassium – 40. This directly confirms the plant potential for phytoremediation.

In the USA and Spain, Paulownia is used as plantings on the depleted soils, in quarries and along the roads.

Paulownia also grows on landfills of various origins on the different soils [35, 36]. The authors also have their own experience of planting royal Paulownia plants on landfills and anthropogenically polluted areas.

Changes in the annual temperature in the Forest-Steppe over the last 100 years are 0.7 – 0.9 °C toward warming. Warming is 1.2 °C in winter, warming is 0.8 °C in spring, the changes are insignificant in summer and autumn. Precipitation falls unevenly with frequent absence and drought. In the west and south, snow cover is formed in the second half of December and lasts for 60 – 80 days, reaching a height of 20 cm [37].

Therefore, reasonable placement of energy crops in space and time is a decisive factor in extreme conditions, under continuous climate changes. The agrobiological characteristics, soil and weather conditions of the territory should be taken into account as well. This will ensure their growth and development close to optimal and provide a high biomass yield. We have modeled the component structure of energy crops plantation and included woody and herbaceous energy crops into the forest shelter belts.

The structure of sown areas provides for the placement of several strips of companion crops of energy crops (legumes are placed in row-spacings) on marginal lands. A field-protecting strip of energy crops (perennial sorghum and paulownia) is laid along the perimeter of the field. This achieves a semi-blown structure of the forest belt – the lower and middle layers are occupied by perennial sorghum, sown in wide row-spacings of paulownia (upper layer of forest belt).

In this case, the maximum effect is achieved: the water regime of the field is improved (due to snow retention in winter), and air currents do not blow the top soil layer from crop rotation [38].

The scheme of artificial phytocenoses creation and recultivation of lands by using energy crops will be the following (Fig.).

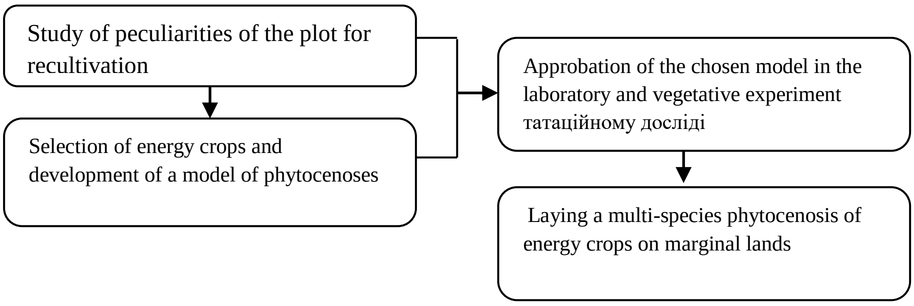

Fig. The scheme of artificial phytocenoses creation and reclamation of lands by using energy crops

The application of this scheme will result in reasonable development of agricultural techniques for biological recultivation of disturbed lands (ecological and adaptive elements of cultivation technology). These agrotechnological elements include: various types of tillage, landscaping, preparation of seed and planting material, sowing and planting of energy crops according to the developed scheme, taking into account the seeding rates of seed or planting material and care of crops.

Thus, the following measures are necessary while creating artificial phytocenoses of energy crops:

- to study thoroughly the features of the plot for recultivation: landscape, agrochemical parameters of the soil, natural vegetation, etc.
- to select plants taking into account the compatibility of their cultivation in grass mixtures on the basis of laboratory and vegetation experiments,
- to place energy crops in strips together with legumes according to the developed model of phytocenoses,
- to place woody and herbaceous crops along the perimeter of the energy plantation. They will perform the functions of protection of the main crops against the wind.

Therefore, study and selection of energy plants for the creation of artificial phytocenoses with subsequent cultivation on reclaimed lands should be carried out on the basis of agri-environmental monitoring and justification. Energy crops must be cultivated on the basis of the ecologically adaptive technology elements, taking into account the certain territorial conditions. This complex will reduce the negative impact on the environment and help to obtain a stable yield of various biomass for its further processing and energy conversion on the territory of Ukraine.

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4.6 Technology of scientific and advisory support for agro formations and rural population of the carpathian region

ТЕХНОЛОГІЯ НАУКОВО-КОНСУЛЬТАЦІЙНОЇ ПІДТРИМКИ АГРОФОРМУВАНЬ ТА СІЛЬСЬКОГО НАСЕЛЕННЯ КАРПАТСЬКОГО РЕГІОНУ

Одним із основних напрямів державної аграрної політики є інформаційне забезпечення сільськогосподарських товаровиробників, надання їм консультаційних послуг дорадчої служби; узагальнення і розповсюдження досягнень науки і техніки, вітчизняного та зарубіжного досвіду у сфері розвитку сільського господарства. На сьогоднішній день, наукові установи та інформаційно-аналітичні організації ще не в повній мірі забезпечують суб'єкти товарного ринку необхідною об'єктивною оперативною інформацією для успішного ведення комерційно-господарської діяльності.

The creation of innovative technologies for processing vegetable crops is primarily associated with obtaining high-quality seed material. Particular attention in the presented work is paid to the definition of drying regimes of pumpkin seeds for seed use with the justification of the rational regime. Rational drying regime was determined by quality parameters: growth energy, germination and seed growth intensity. However, the work also presents a technological scheme of complete processing of pumpkin to obtain three components: seed, seeds for food consumption, pumpkin powder for food.

Key words: pumpkin seeds, drying kinetics, drying mode, drying stand, innovative technology, quality.

4.3 D'omin Dmytro, Kulyk Maksym, Rozhko Ilona AGROECOLOGICAL FUNDAMENTALS OF CREATION OF ARTIFICIAL PHYTOCOENOSIS OF ENERGY CROPS FOR RECULTIVATION

The publication provides a scientific justification for the necessity to use energy crops in order to improve marginal lands through recultivation. The biological description of energy crops that can be used as the components of grass mixtures and peculiarities of their cultivation are given. An attempt has been made to optimize the structure of the phytocoenosis on the basis of the best placement of energy crops in the area for reclaimed lands. That will enable to get the sustainable yield of energy crops, improve the environment and achieve sustainability of raw materials to produce biofuel.

Key words: energy crops, biological features, marginal lands, reclamation, environment.

4.4 Viktor Tymchuk, Volodymyr Matviiets, Liudmyla Biliavska METHODOLOGY OF EVALUATION THE OWNER OF THE OBJECT OF INTELLECTUAL PROPERTY RIGHTS IN THE MARKET OF SELECTION-SEED INNOVATIONS

Challenges of assessment methodology the owner of the object of intellectual property at the market of innovation in breeding and seed production are discussed. Currently, only few originators are ready for appropriate innovative transformations and support of high-intensive product transfer. Therefore, it is rather important to choose active and efficient owners of innovative products and with their subsequent functioning as scientific-methodological and transfer centers.

Key words : assessment methodology, innovations in breeding and seed production, technology transfer

4.5 Kosenko Nadiya AGROBIOLOGICAL ESTIMATION OF DIFFERENT METHODS OF GROWING CARROT SEEDS (Daucus carota L.) UNDER DRIP IRRIGATION IN SOUTHERN OF UKRAINE

Planting mother roots-stacking of carrot at the scheme of planting 70x15 cm under the conditions of drip irrigation in the south of Ukraine provides a higher level of seed yield compared to mother roots of standard sizes. The optimal sowing period for growing seeds without transplanting is the first half of August and the density of growing seed plants is 250 thousand plants /ha. Seeds obtained from planting and by non-transplanting methods of growing carrot seeds correspond to the requirements of the state seed standard of Ukraine.

Key words: carrot, steckling, seed productivity, quality of seed, drip irrigation.

4.6 Mykola Savka, Nataliia Matviiets, Olha Polulikh TECHNOLOGY OF SCIENTIFIC AND ADVISORY SUPPORT FOR AGRO FORMATIONS AND RURAL POPULATION OF THE CARPATHIAN REGION

In modern conditions of agriculture an important task and requirement of time is the improvement of technologies of scientific-consulting and information support of agricultural formations, agricultural producers and rural population, development of new technologies and methods of profitable management, study of developed methods of scientific-consulting and information transfer of complex technologies and innovation. activities. The implementation of measures in the system of scientific and consulting support provides an effective link between agricultural science and education with production, facilitates the transfer of new technologies to the producer and prepares the producer for the perception of technology, improving their working conditions and living standards, and environmental protection.