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M.I. Romashchenko, academician NAAS, doctor of engineering sciences
Yu.O. Tarariko, corresponding member NAAS, doctor of agricultural sciences
A.P. Shatkovskyi, R.V. Saidak, Yu.V. Soroka
candidates of agricultural sciences
Institute of water problems and land-reclamation of HAAH

Scientific principles of development of systems of farming agriculture in zone of Steppe of Ukraine

Aim. To work out scientific principles of development of agriculture in the zone of Steppe of Ukraine. Methods. Analytical methods of researches : analogies, method of expert and economic estimations, calculation-analytical and statistical. Results. On the basis of analysis of climatic changes, statistical accounting, own field researches and review of literary sources the substantive provisions of the modern state and problems of development of agriculture of zone of Steppe are certain, scientifically reasonably directions of his development. Conclusions. Scientific principles of development of agriculture of zone of Steppe of Ukraine are worked out on the basis of energy-savings and ecological safety.

Key words: changes of climate, landed reform, irrigation, structure of sowing.

Steppe occupies south part of territory of Ukraine and stretched out from a south-west on a north-east on 970 kilometres, and from a north southward — a to 500 km Territorial he partly or fully embraces Odesa, Kirovohrad, Dnepropetrovsk, Zaporizhzhya, Kherson, Mykolaiv, Donetsk, Luhansk, Kharkiv areas and Northlands of Crimea. The north limit of zone passes Котовськ along a line — Kirovohrad is Krementchuk — Красноград — Vovchansk[5].

It is known that Steppe is the most zonal natural complex of country : him a general area is about 25 millions and(40% territories), agricultural lands occupy 16,4 millions and, from that plough-land is 13,3 millions and (45% of croplands)[3].

The most widespread soils of Steppe is black earth ordinary and south that together present the 75% areas of natural zone close. Widespread also is to the chestnut and darkly-chestnut soils. Saline lands are formed in подах [11].

The climate of zone of Steppe changes from droughty very warm to very droughty mildly hot. Climatic elements notedly change from a north southward with the internal vibrations of continentalness of climate. On a west he is more warm and moist, on east — more dry and less warm. The driestis districts of the black sea Region lowland [6].

However through the changes of climate toward droughtyness actual limit of dry and very dry zones of moistening of Steppe broadened comparatively with 1960-1990 almost on 13% (rice. 1).

Rice. 1. Districting of of territory of of Ukraine of after the level of providing hydrothermal resources: а — for 1960-1990 ; б — 1990-2010

Among other zones of country the zone of Steppe is characterized by most thermal resources. Sum of temperatures higher after +10oC, in the north and in the center of zone — 2800-3200°C, on a south — 2900-3600°C. Duration of frost-free period — 220-250 days, vegetation — 210-245 days. The annual sum of precipitations for north and central parts of zone of Steppe presents a 400-475 mm, for south are a 250-450 mm, fall out in a warm season sometimes as thundershowers. In addition, in south part annually there are periods without precipitations by duration 25-45 days, when dry north-eastern and east winds that cause ground-air droughts with periodicity one time on 2-3 dominate [6].

In middle for 1960-2014 the annual deficit of water balance in south part of zone presents 380, and on east are a 247 mm, and through global climatic changes, by the state on 2010-2014 he attained already 500 and a 300 mm accordingly (rice. 2)[1].

Rice. 2. Dynamics of annual water balance for 1960-2014: а - Kherson; б - Luhansk

Exactly the unfavorable water mode of soil is the basic factor of development of agricultural production in the zone of Steppe. Presently there are many measures sent to minimization of negative influence of droughts, however most effective are irrigatory land-reclamations.

In the days of rapid development of irrigation in the south region (1966-1990) of area of irrigable earth presented2,3 millions and, id est irrigated every 5th hectare of plough-land. In the zone of Steppe in those times produced: vegetables — close 70%, grains — 55; milk — 40; meat — 30-35%. Id est an irrigable wedge acted part the assured insurance fund of the state [4].At the same time, basic networks and elements of the irrigatory systems (storage pools, channels, pumping stations) built taking into account a prospect that foresaw irrigation on an area 4,25 millions and.

Aim of researches— to work out scientific principles of development of agriculture in the zone of Steppe of Ukraine.

The basic methods of researches are analytical: analogies, the method of expert estimations, economic evaluation, is calculation-analytical and statistical.

Results of researches.The modern state and problems of agriculture are in the zone of Steppe.

1. Change of legal status of earth of the agricultural setting. As a result of the landed reform in a south region the amount of the landed interests attained 4,12 millions Divided into shares irrigable earth appeared, an amount of the landed interests on that is 0,59 million persons. The transition of production of vegetables a water-melon took place because of it, potato, milk and meat from collective large-scale goodsenterprises in the personal peasant economies. However in a small-scale sector more subzero level of mechanization is higher —expenses (in 3 times), there are not terms for revision (sorting, packing) and storage, forming of large parties, export-logistic constituent.

2. Changes touch in the structure of sowing, first of all, considerable reduction of areas of green crops, increase of areas under a sunflower, soy. On the whole, the present structure of sowing dissatisfies to the scientifically reasonable norms and not sent to maintenance and recreation of fertility of soils.

3. Irrigation. In a period an economic crisis 1990-2000 substantially grew short to the area of the actual watering — to 0,41-0,89 millions and, that answers a level 1966-1968 On a background the increase of droughtyness of climate an irrigable wedge presently actually lost his strategic role in providing of food safety of the state. Reduction of watering areas touches the so-called «large irrigation» — overhead irrigation. But the areas of tiny irrigation grew from 4,5 thousands and (1990) to 75,2 thousands and (2014). Basic cultures that grow with application of tiny irrigation, — to the vegetable, baccate, to the fruit and vine. Introduction of high-intensive during growing of these cultures, and also applications of sorts and hybrids with considerable potential give an opportunity to the agrarians annually, during the last 5 years (regardless of weather terms) stably to grow: vegetables is 8-9 million t, cultures — over 1,5and to the vine is 0,5 million t. Such gross collection of vegetables on 100% provides internal demand of country (at the proper terms of storage and processing) at the same time as— on 50, and table vine — only on 20% [8].

Basic agricultural cultures that grow on overhead irrigation is soy (about 85 thousands and), corn and vegetables, considerably less areas under furious and winter-annual grain-growing, by a sunflower, beet saccharine, water-melon cultures and potato. There is irrigation of green crops — exceptionally in diversifyed, where industry of stock-raising functions.

Large reduction of areas of irrigation in a south region, again on a background the substantial increase of droughtyness of climate, stipulated considerable vibrations in this region of annual gross collections of grain and technical crops, the productivity of that is now limited by a water factor.

4. Intensifying of ecological problems of irrigable and unwatering agriculture is in the zone of Steppe. Negative factors: leadingout from the crop rotations (in particular, irrigable) of valuable cultures, increase of areas of sowing under a sunflower, almost complete reduction of bringing of organic fertilizers and volumes of realizations of chemical land-reclamations, irrigation waters of II and III of class of quality, failure to observe of the watering mode. Consequences: water-physical properties of soils became worse, content of humus diminishes, pre-conditions are created for a resalinization, alcalination, there is an underflooding of earth, gets worse them the phytosanitarystate [12].

Directions of development of agriculture are in the zone of Steppe. 1. Renewal and development of irrigation.

From our data [8], for providing of food safety of the state, further increase of export potential minimum the necessary area of irrigable earth must present 1,5-1,7 millions and. It will provide (regardless of weather terms) the receipt of grain — 3,5-4 million t, vegetables — about 5 million t [7], fruit, berries and vine is 3 million t. Such volumes give an opportunity not only to save, but also considerably to promote the role of Steppe in forming of food safety of the state, and also to create pre-conditions for steady socio-economic development of south region. Fundamental distribution after the methods of watering must be such: 1,4 millions and is overhead irrigation (1 million and — broad-cut DM of circular and frontal action, 0,4 millions and —stationary systems of overhead irrigation); 0,2 millions and is tiny irrigation [9]; about 0,1 millions and are superficial methods of irrigation, in particular are rice cotter pins.

Clear that renewal and development of irrigation on quality new require considerable investments — long-term credits with subzero interest rates [14]. In this aspect will mark only, that a structure of management of Ukraine is presently de jure does not give an opportunity to undertake the functions of manager of these money, volume him, obviously, topically question of improvement of control system by both irrigatory networks.

Proceeding in irrigation is needed on modern technical and technological bases, that foresees application водо- but methods and watering facilities, operative management and rationed water consumption.

For prevention of activation of processes of flood,underflooding and other displays of harmful influence of waters of irrigation it follows to conduct on a background reliable drainage and taking of surface-water.

Must become Superimportant basis of renewal and development of irrigation making alteration and adding to the operating normative and legislative acts in part of increase of responsibility of proprietors of the landed irrigable shares for having a special purpose their use and fixing of minimum term of lease on an irrigable share at level no less as 10.

2. Introduction quality of new types of crop rotations both and irrigable terms of conduct of agriculture[10]. It is needed to work out the optimal forms of organization of land-tenure and input of the strictly specialized crop rotations with a short rotary press. The duty of cultures in such crop rotations it follows to conduct by law of that will assist the stable productivity of agriculture on a background maintenance of fertility of soils.

3. Adaptation of unwatering agriculture is to the changes of climate [2].

-introduction of the technologies of till of soil, sent to maintenance of moisture, — mini — till, strep — till, no — till, mulching of soil and other;

- use of operations for the accumulation of moisture —soil, retention of snow on field, use of wings, adsorbents and other;

- growing of drought-resisting cultures, and also drought-resisting sorts and hybrids.

4. Development of stock-raising and vegetable-growing of the closed soil as bases is for creation of new workplaces.

5. Creation of agricultural cooperative stores (ACS).Factors that explain agricultural commodity producers to co-operation are:

* benefit from participating in large on a volume economic operations, creation of competition to the commercial intermediary firms and avoidance of competition inter se, use of professional management;

* possibility to get an income not only from a production but also from the further stages of motion of mine-out by them products (for example, a production is collection and storage is processing — transporting — wholesale — retail business — consumption);

* going into the advantageous markets of sale, in particular and on foreign;

* advantages are from co-ordination of actions, distribution of risk and receipt of market benefit.

The feature of ACS consists in that he:

* it belong to the agricultural commodity producers that manage him on democratic principles;

* renders to the members those services that is needed for their own collective, farmer or personal subsidiary economies;

* does not put an aim the receipt of income on your own, but foresees the increase of income of economies of the members.

6. Creation of specialized basic activity of that is growing of power cultures with their further processing for the receipt of biogas and bioethanol. Under these projects, first of all, it is needed to distinguish of the little use, sandy soils, with a considerable slope, a conduct of traditional agriculture on that is ineffective.

7. Introduction of the systems of biopower agrarian production[15]. Actual presently there is the gradual passing to application of the systems of biopower agrarian production that will provide transformation of high in the products of other level of liquidity and profitability. It is arrived at by forming of the complex, territory infrastructure of agrarian production adapted to present potential. In such biopower irrigable agroecosystems the productivity of plough-land will arrive at 9-10 т к. од./га, that will provide the receipt of greater amount of the done foods of plant-grower, stock-raising, liquid power mediums, and utilization of wastes on biopower complexes will provide own requirements in eider-methane, electro. One of main advantages of such productive systems is passing to principles of organic agriculture. Creation of row of the reserved productive cycles provides the high level of microelements, in particular, to nitrogen — at the level of 70%, to phosphorus — about 80 and to potassium — to 96 %. On irrigation the amount of the wastes of organic fertilizers got in the process of processing suffices for the extended recreation of the humus state of soils. The fertilizers got at methane fermentation are sterile, that will give an opportunity substantially to improve the state of sowing and to the minimum to bring down the pesticidal loading on an environment afterwards.

Creation of such systems requires considerable capital costs — to 170 thousand hrn./and, but also a net income will present a 50-90 thousand hrn./and with the terms of return on investments 2-4.

Conclusions

Due to the landed reform the amount of users of irrigable earth increased considerably, a structure and belonging of reclamative complexes changed. However part of the farm-irrigation systems have status of «unpractical», that resulted in destruction of their elements, plundering of pipelines and, as a result, is violation of technological integrity of the systems. As a rule, the structure of sowing areas does not answer scientific recommendations, the areas of chemical land-reclamation of soils diminished, the volumes of bringing of органіки are sharply brief. Slowly there is a process of introduction of ресурсо— and енергоощадних technologies in irrigable agriculture, the reliable statistical accounting is absent in relation to their use. The consequence of these processes is that irrigable agriculture practically lost the role of factor in food safety of the state, and a zone of Steppe is a role of leading producer of grain. Steady development of agriculture in this region in the conditions of changes of climate is possible only on condition of considerable expansion of areas of irrigable earth and introduction of the biopower systems of agriculture.

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