Features of land management in companies producing essential oil raw materials

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Abstract. During the land reform, new forms of land management and land tenure are being developed. Specialization of the farm depends on the market demand. Oil production is being restored in Russia. It is necessary to combine the area of lands, land composition, soil quality, technological soil properties and crop composition, providing high sales on the world market. The study aims at identifying features of land management in agricultural organizations producing essential oil and medicinal raw materials. The list of crops is based on the assessment of soil fertility and land properties. Land composition and promising types of land management should be determined according to the land survey of land plots, which is the basis for further development of rational organization of the territory, determination of the effectiveness of planned agricultural production.

1. Introduction

The land management in agricultural organizations is carried out according to the inter-farm land management and includes the following stages: determining the area of land; formation of its land mass; location of an economic center; identification of the types and areas of land; determination of boundaries; clarification of modes and conditions of land management; development of a scheme of the territory; development of initial data for determining the land tax, cadastral value of land plots, other economic indicators, as well as information required for inclusion in the land survey plan and the unified state real estate cadastre [1].

The land management in organizations whose specialization is production of essential oil has its own characteristics, due to the influence of natural factors, quality and territorial properties of land on the specialization.

According to some experts, the factors hindering the development of essential oil production are technological ones related to the processing of raw materials [2]. No attention is paid to the choice of crop composition depending on land properties. In this regard, the aim of the study is to establish the relationship of land properties and crop composition within the specialization of the company, as one of the factors contributing to the development of essential oil production and increasing its effectiveness.

2. Materials and methods

Let us analyze the types of land use for a farm in the Caucasus foothills of the Black Sea coast of Krasnodar Krai. The basis for the land use is the ownership of five land plots with a total area of 284.62
hectares, whose location and boundaries are recorded in the unified state register. The plots border and form an irregularly shaped area. They are connected due to the existing road network.

In order to determine the direction of agricultural land use and specialization of the farm, it is necessary to assess quality of the land, its technological and productive properties.

The relief can be described as weak, medium and strong slopes. There are watershed tops and beam bottoms. The relief indicators have been studied in detail: the slope and the slope exposure (Table 1).

### Table 1. Characteristics of land plots for slopes and slope exposure (ha)

| EXPOSURE        | P1 | P2  | P3 | P4  | P5  | Slope, ° | P1 | P2  | P3 | P4  | P5  |
|-----------------|----|-----|----|-----|-----|----------|----|-----|----|-----|-----|
| Northern        | -  | 0.22| 1.84| 0.52| 0.22| 2-2.5    | -  | 0.22| 6.12| 0.70|
| North-eastern   | -  | 0.83| 2.67| 1.80| 2.15| 5-7.5    | 0.18| 6.12| 0.70|
| Eastern         | -  | 8.69| 6.26| 2.88| 5.75| 7.5-10   | 1.22| 6.12| 0.70|
| South-eastern   | -  | 21.14| 22.24| 6.34| 7.5-10| 2.77| 5.28| 0.53| 25.41| 20.82|
| Southern        | -  | 6.90| 41.52| 4.24| 10-15| 5.35| 37.03| 4.59| 52.82| 43.69|
| South-western   | 0.05| 3.83| 1.31| 5.61| 15-20| 0.05| 20.82| 0.13| 7.48| 6.55|
| Western         | 6.16| 24.10| 3.99| 34.63| 14.38| >20| -    | 4.02| 0.02| 4.52|
| North-western   | 2.65| 4.54| 0.09| 20.34| 7.72| -    | -    | -    | -    |
| Small slope*    | -  | 0.07| 0.66| 0.19| -    | -    | -    | -    | -    | -    |
| Total           | 8.87| 70.33| 5.39| 156.34| 43.69| -    | 8.87| 70.33| 5.39| 156.34| 43.69|
| Total           | 284.62| 284.62|    |    |    |    |    |    |    |    |    |

Note: * On the territory, there are hilltops or saddles, where the slope is close to 0°.

### Table 2. Land use explication

| Parameters                          | Land area (ha) |
|-------------------------------------|----------------|
|                                     | P1  | P2  | P3  | P4  | P5  | Total |
| 1 Deposit                           | 3.56| 11.07| 1.31| 92.31| 16.83| 125.08|
| including slope of <10°:            |     |     |     |     |     |       |
| low afforestation                   | -   | -   | -   | 51.66| 6.50| 58.16|
| medium / heavy afforestation        | -   | 2.73| -   | 1.70| 2.13| 6.56|
| isolated areas of small area, irregular configuration | 0.16| 0.77| -   | 1.38| 0.84| 3.15|
| 2 Vineyards                         | 4.31| 0.03| -   | 25.93| -   | 30.27|
| 3 Gas protection zone               | -   | -   | -   | 8.86| 1.93| 10.79|
| 4 Forest                            | -   | 39.33| 1.46| 8.04| 19.98| 68.81|
| 5 Forest steppe, total              | -   | 18.79| 1.37| 5.30| 4.36| 29.82|
| of which: with a slope of <10° and medium-power soils | -   | -   | -   | 3.25| -   | 3.25|
| 6 Other lands (roads, buildings, wasteland) | 1.00| 1.11| 1.25| 15.88| 0.59| 19.83|
| Total                               | 8.86| 70.33| 5.39| 156.33| 43.69| 284.62|

The plot location zone is characterized by medium and low soddy-carbonate sands, they vary from weakly to medium washed and strongly washed, weak and highly washed ones. Granulometric composition is as follows: marly clay, eluvium marl, deluvial heavy loam, sandstone and gleyed clay. The study took into account data on the content of phosphorus, potassium and organic matter in the soils, soil acidity, and soil fertility [3].
In order to draw conclusions about the suitability of land for agricultural use, the land survey was carried out and the field survey act was compiled. It describes land use condition, gives step-by-step photos of the plot. As a result, after cameral processing of the field survey results, the explication of land use was compiled (Table 2).

3. Results
The survey results showed that earlier an area of 142.95 hectares was used for farming (vineyards). Currently, it is possible to use 94.30 hectares, having taken cultural and technical measures for cutting and pre-sowing tillage. Plots of forest-steppe (3.25 ha) that have a slope of less than 10 °, as well as areas that were used for vineyards can be used. Thus, an area of 169.09 ha can be used.

In the Mediterranean climatic conditions, taking into account the survey of land use, fertility assessment, technological and industrial properties of the land, as well as market needs for medicinal raw materials and essential oils, it is promising to cultivate essential oil and medicinal plants. This is also due to the proximity of the oil processing plant (3.5 km).

In Krasnodar Krai, the list of essential oil and medicinal crops is quite extensive, there are 52 species [4]. However, taking into account the soil properties characteristics and topography, this list is significantly reduced to unpretentious crops, used for producing essential oils and medicines: immortelle, boletus, sweet clover, oregano, St. John's wort, hyssop, calendula, lavender, plantain, wormwood, milk thistle, rosemary, chamomile, yarrow, thyme, wild rose [5].

![Figure 1. The scheme of on-farm organization of the territory](image)

Based on the total area suitable for cultivation, growing technology, land composition can be determined. It is advisable to use 91.26 hectares for perennial plantations of essential oil and medicinal crops, 47.56 hectares - for crop cultivation, 30.27 hectares – for vineyards. Figure 1 shows the plots that are suitable for cultivation of annual (biennial) plants, perennial essential oil and medicinal plants.

The list of areas by the plots on the map is shown in Table 3.

As a result of the formed land plots and crop rotation, a business plan is drawn up taking into account
possible volumes of agricultural production, work sheets, local and summary estimates are compiled. Approximate estimates show that at prices for essential oil and medicinal raw materials, the sale of 600 tons of raw materials will allow the farm to gain profit of about 40 million rubles at annual costs of 24-26 million rubles.

When confirming the effectiveness of the planned production, the project of on-farm land management of agricultural organization is developed. It arranges the territory of the land, contains detailed calculations. Then the project is implemented.

| Table 3. The consolidated list of land suitability for crop production |
|---------------------------------------------------------------|
| Parameters                                               | P1     | P2   | P3     | P4     | P5     | Total (ha) |
| Vineyards                                               | 4.31   | 0.03 | 25.93  | -      | -      | 30.27     |
| Medicinal crop rotation                                 | -      | -    | 47.56  | -      | 47.56  | 169.09    |
| Perennial plantations of ethers and medicinal crops     | 3.56   | 15.96| 2.68   | 49.26  | 19.80  | 91.26     |
| Other lands                                             | 1.00   | 54.34| 2.71   | 33.58  | 23.89  | 115.53    |
| Total                                                   | **8.86** | **70.33** | **5.39** | **156.33** | **43.69** | **284.62** |

4. Conclusion
The land management in an agricultural organization, identification of its specialization should be related to the comprehensive assessment of land (topography, soil, climatic features), its suitability for cultivating crops. The land quality dictates the list of cultivated plants, and specifics of production. The land management in organizations producing essential oil and growing medical plants should be carried out according to the inter-farm land management scheme.

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