

# TO THE PROBLEM OF PRODUCTIVITY BOOST OF THE FIELD SEED TURNOVER SEGMENT OF WINTER WHEAT – CORN – SUNFLOWER ON THE SOUTHERN BLACK SOIL

*E.V. Agaphonov, R.A. Kamenev*

*Don state agrarian university. Persianovsky, Rostov Region, Russia  
dgau-web@mail.ru*

In conducting research in the conditions of the Rostov region in southern black soil in 2011-2014 have established that the use of chicken litter rotted manure in pairs increases productivity level field crop rotation of winter wheat – maize – sunflower at 2.05 t / ha of grain units or 20%. Economically viable is to transport litter manure at a distance of 35 km from the place of storage.

Key words: chicken litter rotted manure, winter wheat, maize, sunflower, southern black soil

In the context of the intensification of agriculture rotations do not lose their relevance. Science-based approach to the selection of crop rotation allows not only the most efficient use of fertilizers, pesticides and energy and ultimately increase the yield per unit area, but also to provide an opportunity for expanded reproduction of soil fertility. Crop rotation should be selected taking into account soil and climatic conditions and specialization of services [1]. Knowledge of the biological characteristics of plants and placing them in a rational link crop rotation helps to solve the issues of the needs of all cultures in mineral elements, which is the basis of plant productivity [2]. Improving soil fertility is not possible without respect for the law back to the soil of substances that are used to create crop plants. Recently, due to the decline in livestock has decreased dramatically the amount of manure used as an organic fertilizer. Therefore, the farmers had to pay attention to other sources of replenishment of humus [3].

Poultry litter is a valuable organic fertilizer that contains all the necessary elements for plant nutrition food, and for them in a favorable combination. In recent years, in our country, there is a tendency to reduce the amount of organics introduced into the ground, which naturally leads to a reduction in reserves of nutrients and humus in the soil and thus reduce yield [4]. According to VP Ly-senko [5] are currently operating in the Russian Federation 450 poultry farms. In general, the year of the poultry industry receives more than 30 million. Tons of comet mass. Its widely used by field crops will help solve several problems of agricultural production: increase of soil fertility, productivity, quality of field crops and manure disposal in areas adjacent to the poultry farms. Poultry – dynamically growing livestock sector in the Russian Federation. Rostov region is the leading producer of poultry meat and eggs in the Southern Federal District [6]. In the Rostov region in 1995 conducted a study on the impact of different types of poultry manure on the yield of field and vegetable.

It was found that the application of rotted chicken manure at a dose of 10.0 t / ha in the spring under presowing cultivation on chernozem ordinary under corn increased its yield by 1.27 t / ha. He had a significant yield effects in the subsequent cultures: for the second year in the spring barley obtained yield increase of 0.65 t / ha, and the third on millet – 0.45 t / ha. The total grain harvest for control variant in the link of a field rotation was 10.77 t / ha. Application of manure increased it to 2.77 t / ha or 25.7% [7]. In field experiments conducted in 2010-2012. in agrofirma "Novobatayskaya" Kagalnitsky district of Rostov region, found that the introduction of the optimal dose of manure 15.0 t / ha in the autumn plowing provided higher yields of sugar beet roots by an average of 20%, and the collection of sugar from 1 ha – 26%. The effect of the litter was higher than that of mineral fertilizers. The use of chicken manure resulting in savings of at least 270 kg / ha of NPK fertilizer. [8] The study of not only the direct effect of the litter, but the aftereffect on the second and third year after application.

The aim of our research was to determine the effect of rotted chicken manure on a bed of straw on the efficiency of a link of a field rotation winter wheat – maize – sunflower under Kamensky district of Rostov region. Field experiments were carried out in SEC farm "Kolos" Kamensky district of Rostov region in the 2011-2014 year. The technology of cultivation of winter wheat, corn and sunflower – consistent zonal recommendations in the Rostov region. Preceded by winter wheat – fallow. Soil pilot area – the southern black soil. The object of research was sort of winter wheat Governor Don. The experimental setup consisted of: control (without fertilizer), 5, 7.5, 10, 15 and 20 t / ha rotted chicken manure litter. Litter introduced into the steam box (12.05.11.), According to experimental scheme. Harrow terminations performed on two tracks. Repeated experience fourfold. Bookmark experiments, making observations and taking into account during the growing season according to the procedures carried out experiments with fertilizers [9]. During the experiment used rotted chicken manure on the straw cutting production company "Optifood Center" Kamensky district in which the actual moisture contained 3.2% total nitrogen, 1,9% P<sub>2</sub>O<sub>5</sub> and 3,0% K<sub>2</sub>O.

Among the factors of weather conditions that have had a negative impact on the growth and development of winter wheat in the 2011-2013 agricultural year are as follows. Very high temperatures in September – on 2,70S overweight contributed to increased evaporation of soil moisture and deterioration of moisture winter wheat plants at an early stage of development. Much warmer than normal and were all spring and summer months. In June and July it was accompanied by a large deficit of precipitation, which resulted in severe air drought. End grain filling and maturation took place in a rigid lack of moisture.

In the 2012-2013 agricultural year, the total rainfall was 88 mm below the norm and was 359 mm. Shortage of rainfall took place in the autumn and spring months, which did not contribute to the accumulation of a large amount of moisture in the soil for sowing maize. The temperature in the spring and summer has been even higher than in 2012. However, rainfall in the June-August-term average rate of slightly different, and in September – exceeded it. This will soften the negative impact of high temperatures and has created satisfactory conditions for the formation of the crop.

The main feature of 2013-2014 agricultural year in terms of weather conditions, compliance requirements sunflower is a very sharp increase in temperatures and reduced humidity in the flowering phase in July. If the average temperature in June was equal to 19.5, in July – 24,30S. Relative humidity was 62 June and July 41%. Characterized by a large deficit of moisture and all thereafter filling and ripening. In August, it has fallen only 3 mm. In such harsh conditions it has been formed and therefore low yields of sunflower seeds. Number of productive moisture in a meter layer of soil for sowing winter wheat was low – 74.4 mm (Table. 1). This is almost twice below the average moisture content of precursor vapor. It is particularly important that the deficit occurred in the 0-20 cm soil layer – only 8 mm. It is not enough for intensive germination and the normal development of plants in the first period.

Subsequent rainfall more to improve the situation, but to completely eliminate stunting could not. A substantial replenishment of soil moisture was in the autumn-winter period. In the spring the plant formed a large vegetative mass, but its potential has not been realized sufficiently due June drought. By cleaning productive moisture it was not practical in all meter layer.

Table 1. Dynamics of productive moisture in soil under field crops, mm

| Winter Wheat 2011-2012 |  |                                     |                         |                           |
|------------------------|--|-------------------------------------|-------------------------|---------------------------|
| Soil layer, cm         | Before sowing<br>September, 5,<br>2011 | Spring tillering<br>April, 24, 2012 | Earing<br>May, 22, 2012 | Harvest<br>June, 23, 2012 |
| 0-20                   | 8,0                                    | 37,7                                | 19,7                    | -                         |
| 0-60                   | 42,8                                   | 103,2                               | 36,6                    | 4,3                       |
| 0-100                  | 74,4                                   | 165,1                               | 50,9                    | 10,7                      |
| corn 2013              |  |                                     |                         |                           |

| Soil layer, cm | Before sowing<br>April, 25, 2012 | 7-8 leaves<br>June, 12, 2013 | Milk-wax ripening<br>July, 18, 2013 | Harvest<br>September, 5, 2013  |
|----------------|----------------------------------|------------------------------|-------------------------------------|--------------------------------|
| 0-20           | 27,5                             | 12,0                         | 1,5                                 | 12,6                           |
| 0-60           | 86,1                             | 46,2                         | 6,3                                 | 31,6                           |
| 0-100          | 135,4                            | 86,2                         | 37,8                                | 59,5                           |
| sunflower 2014 |                                  |                              |                                     |                                |
| Soil layer, cm | Before sowing<br>April, 25, 2014 | Budding<br>July, 12, 2014    | Bloom<br>July, 18, 2014             | Harvest<br>September, 25, 2014 |
| 0-20           | 26,2                             | 13,7                         | 5,0                                 | 10,9                           |
| 0-60           | 81,8                             | 46,3                         | 22,2                                | 26,0                           |
| 0-100          | 123,2                            | 78,2                         | 40,8                                | 40,5                           |

Moisture reserves in the soil for sowing maize in 2013 was at the level of average – 135.4 mm. His decline was going intensively to the phase of milky-wax ripeness. At this point in the 0-60 cm soil layer available moisture was very small – 6.3 mm. Need to be met at the expense of plant deposits. In August, they fell to 10 mm more than the norm. Completion of vegetation were held in a good supply of moisture and moisture in soil replenished, mainly in the 0-60 cm layer. Moisture reserves in the soil for sowing of sunflower in 2014 was in the first meter of soil in all 123.2 mm. He gradually decreased until the flowering phase in all layers of the soil and as a whole was 40.8 mm. On the same level, he preserved and harvesting seeds. The content of available moisture in the soil indicating that the sunflower plants were supplied with moisture satisfactorily throughout the growing season. Most of the negative role played by the very high temperatures and air drought.

Table 2. Winter wheat yield in 2012 control was 2.98 t / ha

| Variant           | Winter wheat<br>t / ha | Adding to control |    | Corn<br>t / ha | Adding to control |    | Sunflower<br>t / ha | Adding to control |    |
|-------------------|------------------------|-------------------|----|----------------|-------------------|----|---------------------|-------------------|----|
|                   |                        | t / ha            | %  |                | t / ha            | %  |                     | t / ha            | %  |
| control           | 2,98                   | -                 | -  | 5,08           | -                 | -  | 1,17                | -                 | -  |
| 5,0 t / ha        | 3,38                   | 0,40              | 13 | 5,29           | 0,21              | 4  | 1,18                | 0,01              | 1  |
| 7,5 t / ha        | 3,84                   | 0,86              | 29 | 5,37           | 0,29              | 6  | 1,20                | 0,03              | 3  |
| 10 t / ha         | 4,10                   | 1,12              | 38 | 5,74           | 0,66              | 13 | 1,29                | 0,12              | 10 |
| 15 t / ha         | 3,85                   | 0,87              | 29 | 5,78           | 0,70              | 14 | 1,36                | 0,19              | 16 |
| 20 t / ha         | 3,35                   | 0,37              | 12 | 5,96           | 0,88              | 17 | 1,55                | 0,38              | 32 |
| HCP <sub>05</sub> | 0,21                   | -                 | -  | 0,30           | -                 | -  | 0,10                | -                 | -  |

This is well below its potential for sowing for a couple. They have not been implemented due to lack of moisture at planting and during the second half of the growing season. A significant impact on productivity was the use of chicken manure. Even when you make a minimum dose of 5 t / ha, it increased by 0.40 t / ha, with an increase in the dose up to 7.5 t / ha – still 0.46 t / ha. The peak was reached at Making 10 t / ha – 4.10 t / ha. Increasing the dose to 15 and especially 20 t / ha cause negative effects. Yield reduction was significant – 0.25 and 0.75 t / ha. Apparently, this can be explained

by the increase of concentration of the soil solution at low soil moisture. According to VP Lysenko (2011) located in the litter of uric acid in the introduction of high doses inhibits the growth of young plants. Grain yield of maize – the second culture in a part of crop rotation in 2013 on the control variant was 5.08 t / ha. The increase from the aftereffects of chicken manure at doses of 5 and 7.5 t / ha was within 0,21-0,29 t / ha, which is below the NDS experience. Almost the same effect is obtained on variants with doses of 10 and 15 t / ha, the yield increased 13 and 14%. In the embodiment with an aftereffect of manure at 20 t / ha, it increased by another 0.18 t / ha, but this change is not significant. Yields of sunflower seeds in 2014 was low for the above reasons, it has been under control is 1,17 t / ha. The worst aftereffects of chicken manure showed a variant with a dose of 20 t / ha. The increase in control was 0.38 t / ha or 32%. The advantage of the impact on productivity of 20 t / ha compared to the dose of 15 t / ha significantly. For conversion yields of crops in grain units were used the following factors: winter wheat – 1.00, maize – 1.14, sunflower – 1.47. The total grain harvest units in a part of crop rotation to control variant amounted to 10.49 t / ha (Table. 3).

Table 3. Seed yield of field sowing turnover, t/ha seed units

| Variant           | Seed turnover |      |           | Total harvest | Adding |    |
|-------------------|---------------|------|-----------|---------------|--------|----|
|                   | Winter wheat  | Corn | Sunflower |               | t/ha   | %  |
|                   | 2012          | 2013 | 2014      |               |        |    |
| control           | 2,98          | 5,79 | 1,72      | 10,49         | -      | -  |
| 5,0 t/ha          | 3,38          | 6,03 | 1,73      | 11,14         | 0,65   | 6  |
| 7,5 t/ha          | 3,84          | 6,12 | 1,76      | 11,72         | 1,23   | 12 |
| 10,0 t/ha         | 4,10          | 6,54 | 1,90      | 12,54         | 2,05   | 20 |
| 15,0 t/ha         | 3,85          | 6,59 | 2,00      | 12,44         | 1,95   | 19 |
| 20,0 t/ha         | 3,35          | 6,79 | 2,28      | 12,42         | 1,93   | 18 |
| HCP <sub>05</sub> | 0,25          | 0,33 | 0,11      | -             | -      | -  |

The greatest result of the use of chicken litter provided manure at 10 t / ha. Yield compared to the control increased by 2.05 t / ha grains units or 20%. Due to the high-effect in the second and third year of the effectiveness of manure in doses of 15 and 20 t / ha as a whole in a part of crop rotation almost equal to the results obtained with the introduction of 10t / ha – an increase in the yield of grain units was within 18-19%. To assess the effect of economic manure used actual production costs and purchase prices in force in the SEC farm "Kolos" Kamensky district of Rostov region: 7300 rubles per 1 ton of grain of winter wheat, 6,000 rubles per 1 ton of maize and 12 000 rubles per 1 tonne of sunflower seeds. The calculation of the economic efficiency of growing crops in the link of a field rotation winter wheat – maize – sunflower showed that the level of profitability in the control variant (without fertilizer application) was 87%, the production cost of 1 kg of grain units – 3.37 rubles. Optimal economic indicators obtained from a variant with manure at 10 t / ha while limiting the application range in the field of storage of not more than 35 km. Thus, the use of chicken manure on a straw mat in pairs for winter wheat on chernozem southern contributes to a significant increase in productivity not only of culture but following it in the corn for grain and sunflowers. This dramatically improves economic performance.

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