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Krasnodar Krai Field Day

«Different Methods for the Use of Agricultural Residue other than Burning»

October 16, 2014

Location: Kuban State Agricultural University, main building, Conference Room №1, Kalinin Street 13, Krasnodar.

Organizers: ERC Bellona, ICCI, Krasnodar Krai ACCOR

Program

9:30 – Registration

10:00 -10:30

Opening session:

Viktor Sergeev, President, Krasnodar Krai ACCOR

Alexander Rodin, President Rostov Oblast ACCOR

Elena Kobets, ERC Bellona, “Goals and Task of the Project to Decrease Agricultural Burning in Russia,” presentation of brochure.

10:30-11:15

Alexander Labyntsev, Doctor of Agricultural Sciences and Professor, “Complementary Production of Agricultural Products – Source of Additional Organic Matter in the Soil and Nutritional Elements,” Don Scientific-Technical Agricultural Institute.

11:15-12:00

Nikolia Zelenskii, Doctor of Agricultural Sciences and Professor, “Binary Planting of Agricultural Cultures in No-Till,” Don Agrarian University

12:00 -12:30 - Coffee Break

12:30 — 13:45

Alexander Fyodorenko, Director of “Olimp” “Practical and Economic Aspects of Working with No-Till in the Agricultural Conditions of Rostov Oblast”

13:45- 14:30 – Presentation by Representatives of Krasnodar Krai (Vladimir Gavrilenko, Alexander Titov and others)

14:30 -15:00 - Open discussion

15:00 -16:00 – Lunch

16:00 -18:00 ACCOR Council meeting

45 participants attended among whom:

Representatives of the Ministry of Agriculture, regional leaders of ACCOR, representatives of agricultural cooperatives, farmers, representatives from the media, and representatives from the all-Russia organization of agricultural women.

Short Summary of Presentations

Victor Sergeev:

- We begin the work of the council of Krasnodar Krai ACCOR. On the agenda are a number of items, including information on the project, "Atmospheric Pollution and the Arctic Climate." We will hear from our colleagues from St. Petersburg, after which we will discuss internal matters.

Alexander Labyntsev:

My presentation is called "*Complementary Production of Agricultural Products – Source of Additional Organic Matter in the Soil and Nutritional Elements.*" Research shows that 9 – 13 tons of biomass are produced per hectare, regardless of crop rotation. This is the potential that is almost totally unused. It comes from the production of primary and complementary crops (ca. 60-65%) and crop residues (30-40%). The share of the primary production is only about 35-40 percent. Unused production is about 3 to 4 tons, or with rotation with medick, up to 5 tons. And this is with a hectare of average productivity of 37-39 tons/ha. In the more advantageous conditions of Krasnodar Krai this is even higher—40-50 tons/ha. Adding mineral fertilizers improves not only the share of the primary crop, but also the complementary production (although it decreased the share of root residue).

Each year in Krasnodar Krai 13-15 million tons are produced, of which 5-6 million tons of carbon, 50-60,000 tons of nitrogen, phosphorus 20-30,000 tons and calcium 190-220,000 tons. In addition, from 315 to 335 million tons of the active ingredients in mineral fertilizer are used each year in Krasnodar Krai (2/3 of this is nitrogen fertilizer).

What can we do with agricultural residues? They used to be regularly burned; today there are some ways to use them productively. The first is strictly commercial – the straw can be granulated and used for heating pellets. In Europe this fuel costs 2-3 euro/kilo. The Southern Federal District has a lot of potential for this kind of production, but one must keep in mind that the priority must be maintaining organic matter in the soil.

With burning, 100% of carbon and nitrogen are lost, 75% of phosphorus and 90% calcium, and organic matter is almost completely burned out of the top 10 centimeters of soil. If we try for a quick mineralization of residue (adding compensatory doses of fertilizer, chopping and incorporating), then we lose 85% of the carbon, 60% of the nitrogen and 30% of the calcium. But if we use soil humification, then we lose only 65% of the carbon, 40 percent of the nitrogen and 10 percent of the calcium.

There are three methods of soil management—traditional, minimal and "zero." "Zero" soil management demonstrates the highest humification of crop residue – one ton of organic matter creates 350-450,000 tons of humus.

With organic matter we also need to keep in mind that in most regions of southern Russia the primary limiting factor is moisture. But the moisture that falls is sufficient for average productivity per hectare, with these other essentials:

- there must be sufficient organic matter in the soil
- the organic matter is in a form that the crop can use
- no unproductive losses

The reality is that we have very low indicators of productive moisture – the water-retention capacity of the soil has declined radically. This is the complex outcome of burning (so-called “black fallow”), the wide use of disc harrowing, and the destruction of the forest belt.

Nicolai Zelinskii:

I will speak about binary sowing and no-till. In Rostov Oblast and Krasnodar Krai the main problem is the declining productivity of the soil. Why do we work with the soil? Only to plant the seed at the proper depth, everything else can be done in other ways. It is important to properly understand the philosophy of soil management.

The situation is such that we have lost a powerful factor for soil productivity –perennial grasses. Many people do not know what to do with them without animal husbandry. Only perennial grasses can effectively combat wind and water erosion, without which we will end up in the same situation as Iran and Iraq. Several thousand years ago the area between the Tigris and Euphrates Rivers was a prosperous and fertile valley and now it is desert.

Many leguminous grasses (sainfoin, sweet clover, medick, winter vetch, etc.):

- can stabilize the agricultural landscape
- have very narrow ratio (from 15-30%) of carbon and nitrogen
- decompose very quickly due to the high concentration (up to 2%) of nitrogen

The binary system with the use of legume crops is a system that facilitates compensation for the unfavorable external conditions and the nutritional deficit of the primary crop. The idea is that the soil is covered by crops all year long. For example, this keeps the temperature of the soil 15 degrees or more lower in summer, and in winter more snow stays on the fields covered with dry growth.

The farm “Don Field” this year harvested from 90 hectares 24 tons/ha. of sunflowers while the neighboring farm harvested 10-12 tons/ha., and this in the extraordinarily dry conditions in Rostov Oblast.

In Southern Russia there are at least six months (August, September, October, November and two spring months) to work with leguminous cultures and creating soil fertility. In Rostov Oblast the annual effective temperature sum reaches 1800 degrees or more –and this needs to be used to improve soil fertility. In Krasnodar Krai the annual effective temperature sum reaches 2300 degrees or more.

During the period of vegetation leguminous grasses can “capture” from the air up to 200 kilos of nitrogen. Complementary crops can be grown with legumes – winter wheat, sunflower, maize – and their post-harvest residues do not need to be burned.

Binary technology has its specifics that must be taken into account. One must:

- Use herbicides to tamp down the complementary legumes in a timely manner
- Create anti-erosion banks in the field

Alexander Fyodorenko:

I am a farmer with 20 years of experience. I have long ago noticed that traditional soil management destroys the soil microflora. I have 650 hectares under cultivation and I have used direct sowing since 2012. It all started as an experiment – on one parcel of land I tried to get rid of all agricultural residue and work the soil in the traditional way, and on the other parcel I took the residue and simply chopped it and spread it on the field.

The first year I tried to sow wheat on the stubble and I harvested 40 tons./ha., so there was no loss of yield.

You cannot sow wheat on wheat to avoid outbreaks of disease. Crop rotation is a necessity.

Advantages:

- the moisture regime of the soil is improved
- expenses on labor and technology are lower
- double savings on diesel fuel

Disadvantages:

- Substantial capital expenses are necessary
- Direct seeding machines are very expensive
- Greater expenses to protect the crop
- Spring planting is later because of greater soil moisture

Vladimir Gavrilenko, head of farmer's enterprise, Three Rivers Region of Krasnodar Krai

Since 2010 I have been using zero soil tilling and direct seeding and I am convinced of its effectiveness. Three years ago my winter wheat survived the winter normally and I harvested 37 tons/ha. in 2012 and all the winter wheat froze at my neighbor's. No-till normalizes the moisture regime of the soil, and because the soil is always covered with growth residue, it is protected from wind and water erosion because there is a protective barrier on the soil. The residue also forms a rich substrata for various biota.

Crop rotation plays a key role in humification. Proper rotation in no-till is extremely important, making it possible to potentially and completely avoid mineral fertilizer. In Ukraine in fields with minimal tillage I observed almost ideal crop rotation -- "wheat-maize-soya." Correct rotation provides for humus accumulation, i.e., it creates the conditions for more complete carbon fixation.

From 2005 to 2019 I worked with minimal soil tillage technology – tilling to a maximum depth of 3-5 cm. In that period the humus content of the soil in my fields increased from 3.2 to 3.9 percent. I would say two words on the production costs of no till. It decreases. This year with a harvest of 52 tons/ha. and taking into account the amortization of the seeding machine, the cost of a kilo of wheat is 3.18 rubles, and of maize – 3.25 rubles. This is enough, even with today's ridiculous purchase prices, to make money.