

## Receiving of winter rapeseed constant yields under unsteady moistening

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### Abstract

Stable yields of winter rape in conditions of unsteady moistening of Northern Caucasus can be received only in the successful wintering of crops which firstly depends on sowing and seedlings appearance dates. This is the reason to direct the preparation system of field to the winter sowing at keeping of residuary water after preceding crop harvesting and its recharge due to precipitations.

The researches on substitution of plowing with surface treatment under the winter rape after the harvesting of preceding crops, conducting since 80-s of last century on the chernozem of different fertility, have shown that seedlings are simultaneous in the years with moisten summer in plowing and subsurface tillage. In drought years subsurface tillage allows receiving of simultaneous seedlings in optimum dates as in plowing seedlings are poor or seeds germinate only after rains, sometimes before winter. As a rule, rather weak plants freeze.

On poor humus chernozems nonplow tillage on depth 6-8 sm. leads to the sufficient differences to the sowing on moisten, solidity and volume weight of surface and subsurface soil horizons. Plants develop surface roots and lowered the productivity.

On deep chernozems in soil treatment with heavy disks on depth 12-14 sm. after cereal preceding crops yield was 3.51 ton/ha on average in 1997-1998 and in variant with surface treatment - 3.25 ton/ha.

In the later studies the negatives of surface treatment were eliminated by means of mineral fertilizers and plant protection preparations. On average a yield at surface treatment was on 5-6% higher than at plots with plowing in 2003-2005.

**Key words:** plowing, surface treatment, winter rapeseed, yields, chernozem.

Stable yields of winter rape on years in conditions of unsteady moistening of Northern Caucasus can be received only in the successful wintering of crops which firstly depends on sowing and seedlings appearance dates. Firstly simultaneity and timeliness of seedlings appearance are determined with moisture content in seedbed which depends on method of soil treatment before sowing. In drought conditions a traditional plowing is inferior really to surface treatment on storage of moisture content in surface horizon to the winter sowing.

The researches on replacement of plowing with shallow subsurface tillage for winter rapeseed after cereal preceding crops, conducting since 80-ties of last century on chernozems of different fertility, have shown that seedlings are simultaneous in years with moisten summer on plowing and shallow subsurface tillage. In drought years shallow subsurface tillage allows receiving of simultaneous seedlings in optimum dates as in plowing seedlings are poor or seeds germinate only after rains, sometimes before winter. As a rule, rather weak plants freeze. Surface treatment has some advantages to plowing on yield only in years with very dry autumn, when seedlings appeared very late and the plant populations decreased too much. If seedlings are simultaneous sowings on plowing are more yielding.

On poor humus chernozems nonplow tillage on depth 6-8 sm. leads to the sufficient differences to the sowing on moisture, solidity and volume weight of loosened and subsurface horizons of soil. Plants develop surface roots and lowered the productivity.

On deep chernozems in soil treatments with heavy disks on depth 12-14 sm. after cereal preceding crops yield was 3.51 ton/ha on average in 1997-1998 in plowing and in variant with surface treatment - 3.25 ton/ha.

The researches of 80-90-ties of last century showed that the main negative factors, decreasing winter rapeseed yield on surface treatment in comparison with plowing, were weeds and preceding crop fall, storage of infections in top soil as well as significant difference on indexes of biological activity and effective fertility of surface (0-10) and subsurface layers.

In 2003-2005 we conducted the studies where the negatives impact of abovementioned factors was eliminated by means of herbicides, fungicides and mineral fertilizers.

Top soil on experimental fields is typical deep heavy loamy chernozem with humus content 4.0-4.25%. Average long-term precipitations are up to 590-600 ml. A sowing area of plot is 100 m<sup>2</sup>, accounting area – 90 m<sup>2</sup>. A preceding crop is winter wheat. As a control was used traditional plowing on the depth 20-22 sm. Surface treatment was double treatment with heavy disks on the depth 10-14 sm. In sowing mineral fertilizers were applied in dozes N<sub>5</sub>P<sub>20</sub>. Additional fertilizing of nitrogen N<sub>90</sub> was done in spring. As herbicide using after seedlings appearance was applied a mixture of biologically active preparations: Butizan – 2 l/ha, Fusillade Forte – 1.2 l/ha. Seeds were treated with TMTD (10l/ha).

In research years the weather was fine so seedlings were simultaneous in all variants. On non-plowed plots the plant population was 5-10% higher then on plowed ones. In winter 2002-2003 temperature was lower then 27 °C for a long period

with snow absence. As a result there were only 3-4 plants per 1 m<sup>2</sup> at harvest, which caused a low yield.

A sufficient mineral nutrition of plants provided uniform fertility of soil horizons. It resulted in formation by plants of good marked, deeply penetrating top root at non-plowed plots.

Herbicides application allowed decreasing weeds on 1.7-2.1 times. A disease affection of plants was minimal in variants with application of seed treatment.

The received yields proved a high efficiency of surface treatments under winter rapeseed after winter wheat on fertile chernozems with application of mineral fertilizers and plant protection preparations (Table 1).

**Table 1. Winter rapeseed yield depended on methods of main soil treatment and plant protection preparations, ton/ha.**

Variants	2003	2004	2005	Average
Plowing on the depth 20-22 sm. (control)	0,84	3,15	2,78	2,26
Plowing on the depth 20-22 sm. + herbicide	0,89	3,23	2,85	2,32
Plowing on the depth 20-22 sm. + seed treatment	0,87	3,19	2,79	2,28
Plowing on the depth 20-22 sm. + herbicide + seed treatment	0,96	3,29	2,87	2,37
Surface treatment on depth 10-14 sm.	0,80	3,24	2,63	2,22
Surface treatment + herbicide	0,91	3,33	2,88	2,37
Surface treatment + seed treatment	0,87	3,31	2,64	2,27
Surface treatment + herbicide + seed treatment	1,00	3,36	2,91	2,42

In all years of researches and in average for three years the biggest yield was got with disk treatment on depth 10-14 sm. with herbicide and seed treatment application.