

# POSSIBILITIES OF ACCUMULATION HUMUS IN ARABLE SOILS

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## Change of the humus level in soils of long field experiments Under the influence of fertilizers

Soils	Variant Experiences	In total variants	Duration of experiences, years		Doses N (kg/ha.) or manure (In a brackets, t/ha.)	Change of the humus level in soils In comparison with ne-fertilised backgrounds		Sources
			$\bar{X}$	Lim		$\bar{X}$ , %	Sx, %	
Sward-podzolic and gray forest	NPK	30	21	12–56	50	+0,06	0,033	Vedening, Ksenofontova, 1982; Arnautova, 1980; Bugaev, Osipova, 1968; Gamzikov, Kulagina, 1992; Gorshkov, Kravchenko, 1978; Masur, 1985; Kalinovskiy, 1981; Maltsev, 2001; Mineev, etc., 1988; Mineev, Shevtsova, 1978; Trofimov, 1975; Tsytsovskiy, 1981; Shevtsova, Drobkov, 1981; etc.
	Manure	26	24	12–56	(10)	+0,25	0,063	
	NPK + Manure	35	18	6–37	34 (6)	+0,09	0,051	
Chernozems	NPK	26	21	6–54	45	+0,08	0,027	Chagina, etc., 1986; Olifer, 1988; Lukyanchicova, 1980; Shamray, Hramtsov, 1985; Krupkin, Chlenova, 1992; Berzing, 2003; Shevtsova, etc., 1989; Chesnyak, 1967; Hramtsov, Voronkova, 2005; Gluhii, etc., 2005; Ohinko, etc., 1990; Stuling, Zolotaryov, 1988; Chub, etc., 1985; Kurakov, Nikitaeva, 1985; Musienko, etc., 1974; Ungurjan, Ilashku, 1987; Kogut, 1987; Gamzikov, Kulagin, 1992; etc.
	Manure	15	25	10–54	(12)	+0,17	0,031	
	NPK + Manure	25	22	10–70	40 (6)	+0,20	0,034	

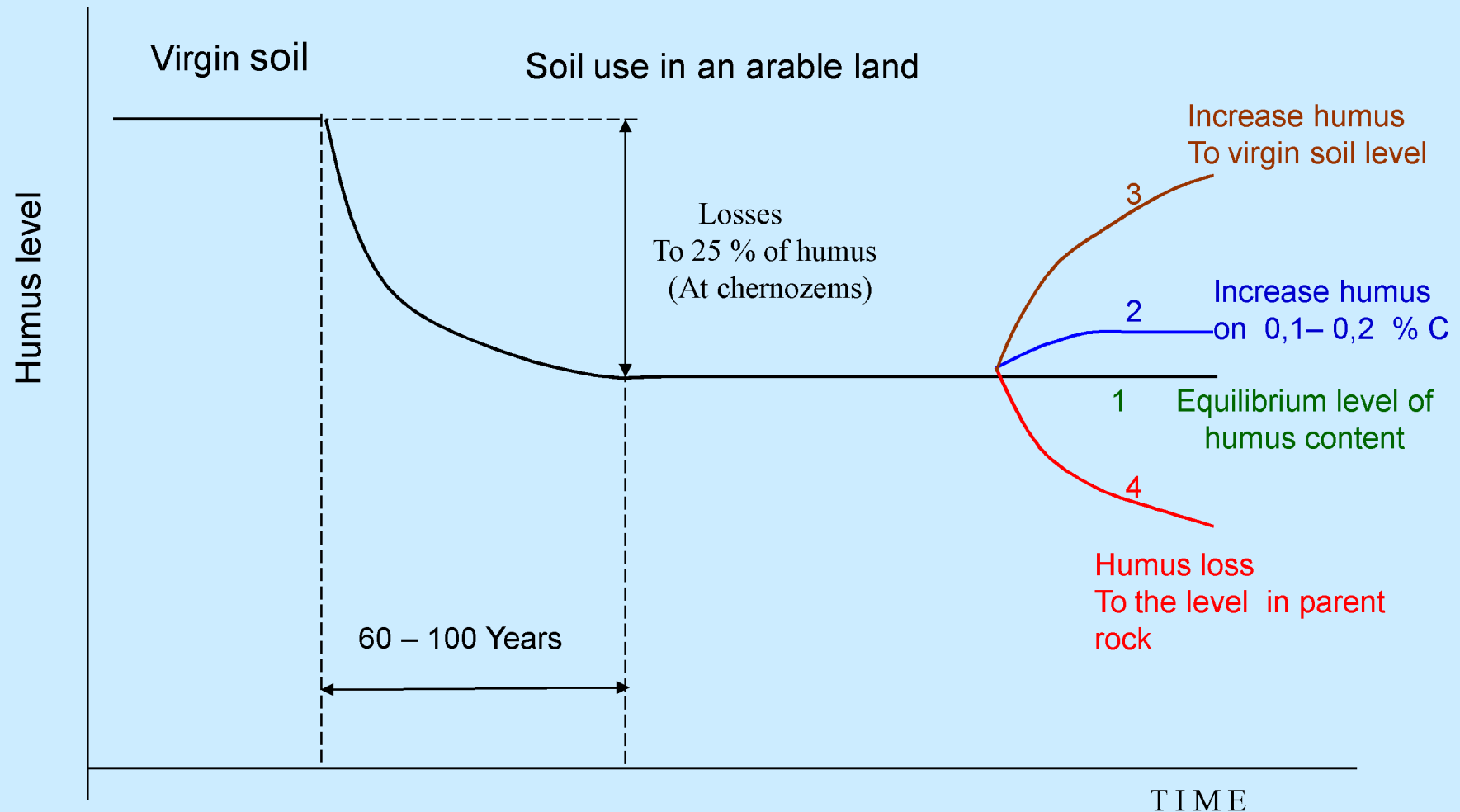
Correlation factors between humus level change  
In soils under the influence of fertilizers and duration of experiences

Soils	Duration of experiences, years	Variants in field experiments		
		Manure	NPK	All variants With fertilizers
Sward-podzolic and gray forest	6 – 56	0,08	0,32	0,19
Chernozems	6 – 70	0,20	0,01	0,35
For all types of soils	6 – 70	0,24	0,14	0,22

## Change of the humus level in chernozems of long field experiments at processing minimisation

Layer of earth, sm	In total variants	Duration of experiences, years		Indicators of change of the humus level in soils at the minimum processings in relation to ploughing			Sources
		$\bar{X}$	lim	$\bar{X}$	Sx, %	P, %	
0-10	33	15	6-27	+0,08	0,015	19	Kirjushin. Lebedev, 1972, 1974; Glushchak, Scherbak, 1984; Hills, Paletsky, 1988; Gorbachev, 1983; Morgun, etc., 1988; Aksenteva, Tchizhov, 1986; Gordienko, Sementsov, 1988; Nazyrova, Garipov, 2005; Viter, Novichihin, 1984; Lisunov, 2002; Azizs, 2005; Deaf persons, etc., 2005.
0-25	40	15	6-28	+0,02	0,016	80	

## The generalised scheme of possible changes of the humus level in soils



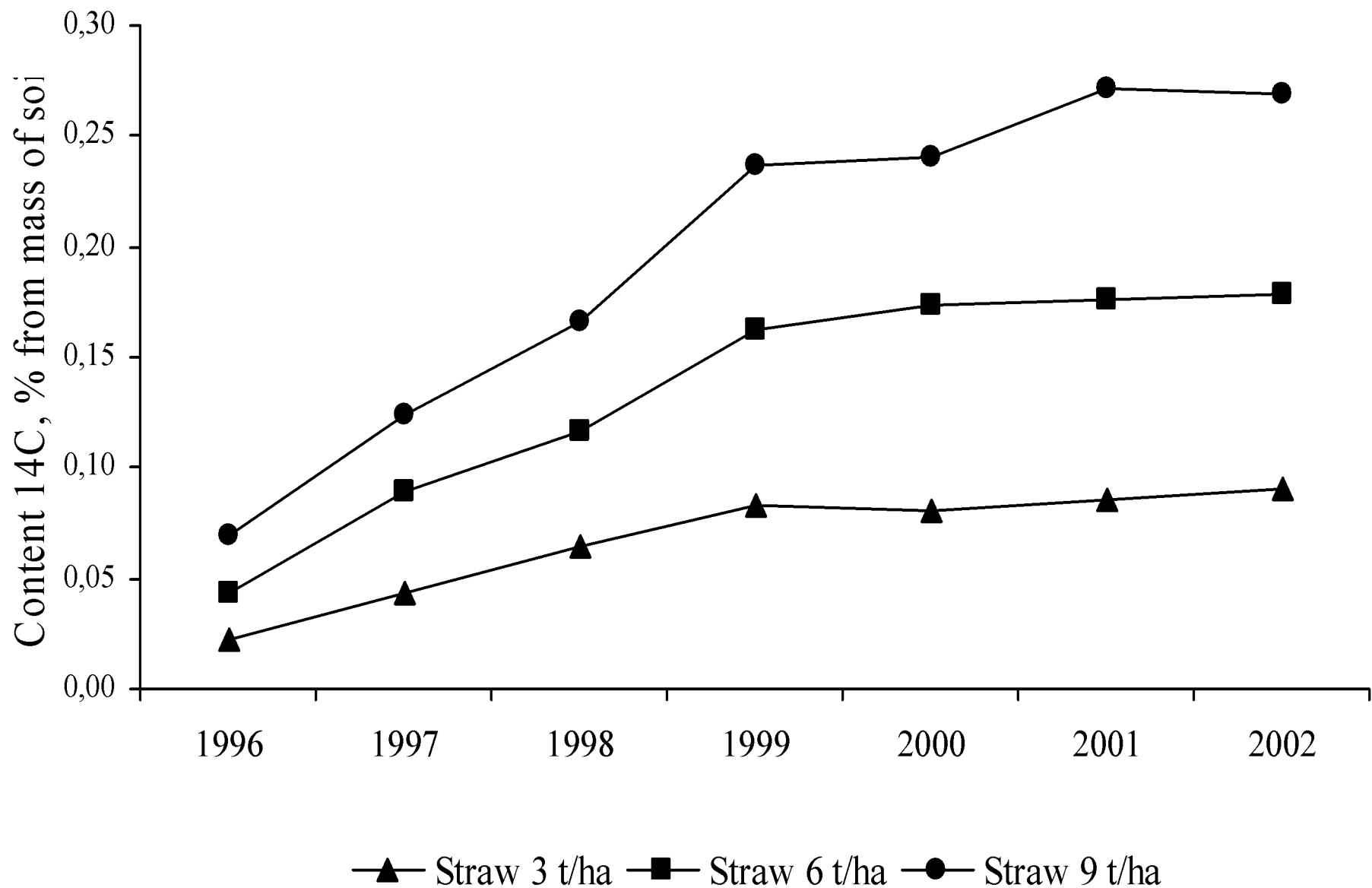
1 – Equilibrium level of humus content

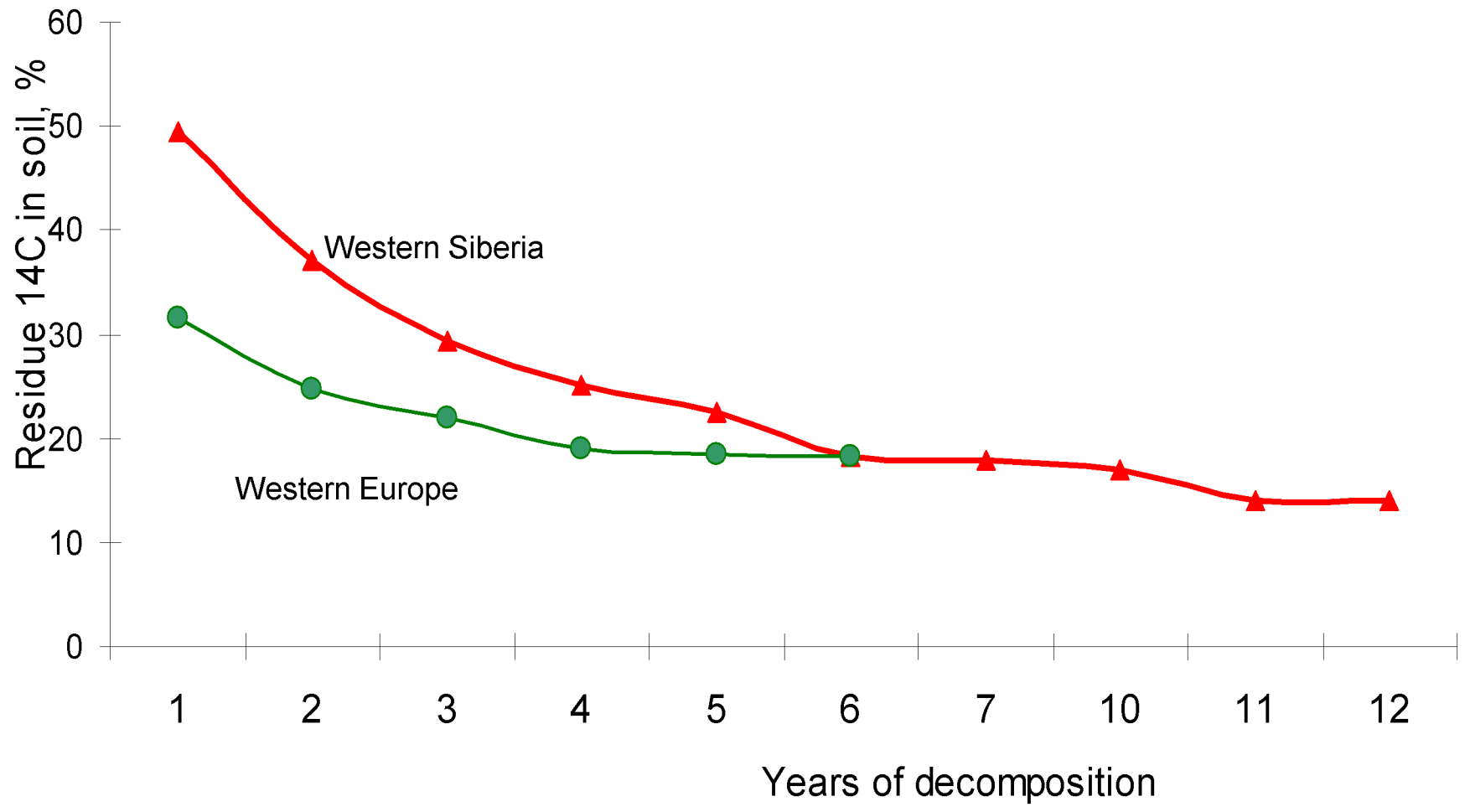
2 – At application of optimum doses of fertilizers and minimization of processing of soil

3 – At application of meliorative doses of manure or peat or soil transfer in old arable land

4 - At progressing erosion

Dynamics of accumulation of carbon in soil at annual application  
Various doses labeled  $^{14}\text{C}$  straw





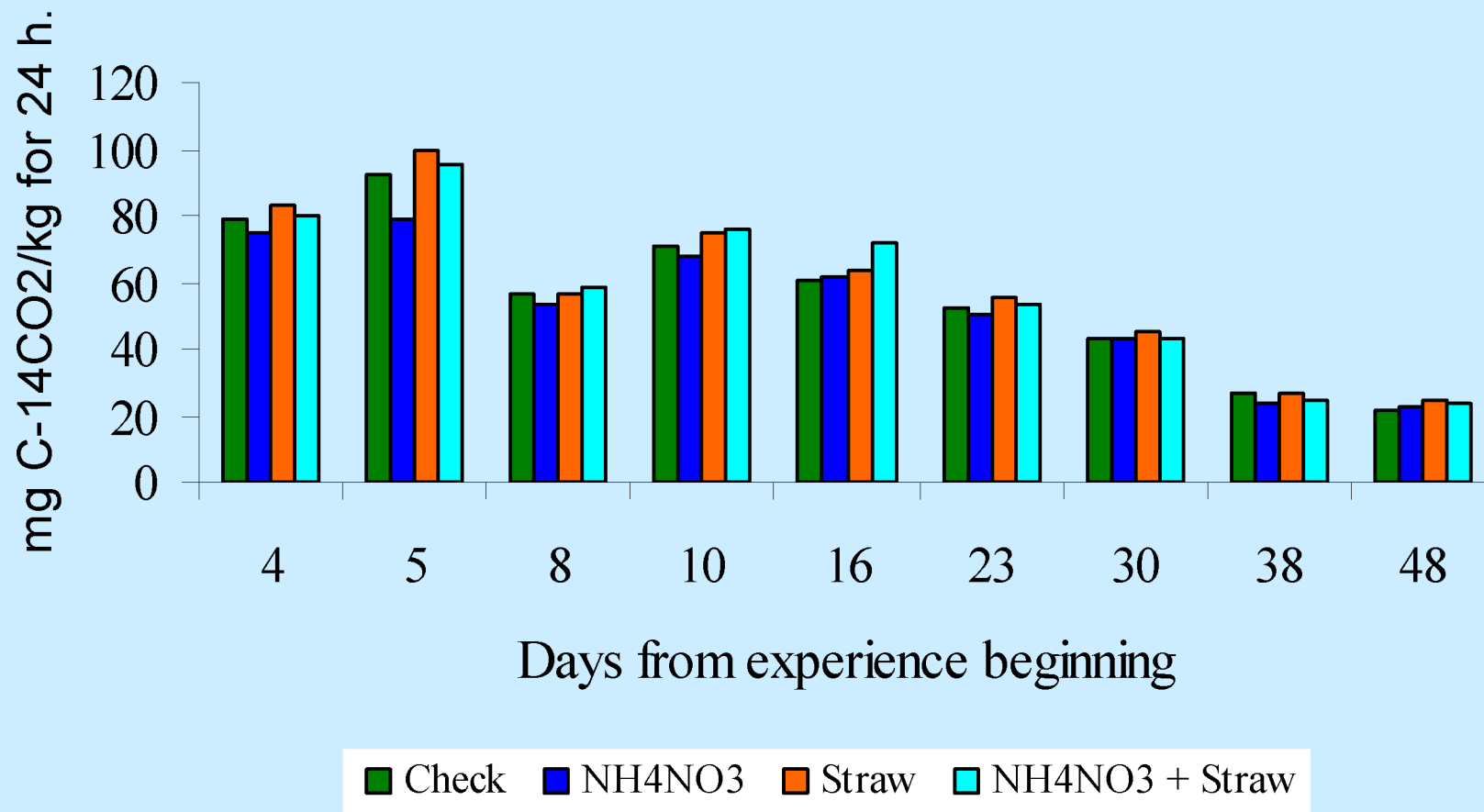
Residue labeled <sup>14</sup>C vegetative biomass in soils Western Siberia and Western Europe

Indicators of organic substance of soils with different  
previous use

Soil, Region	Previous use of soil	C org.		C detritus		C-CO <sub>2</sub> , mg / kg of soil for 5 months	
		%, from mass of soil	%, (relat.)	%, from mass of soil	%, (relat.)	%, from mass of soil	%, (relat.)
Leached Cherno- zem, Novosibirsk	Arable land on grain crops	3,11	100	0,192	100	1616	100
	Bare fallow, 5 years	2,92	94	0,106	55	1272	79
Ordinary Cherno- zem, Barnaul	Arable land on grain crops	3,15	100	0,293	100	2065	100
	Bare fallow, 20 years	2,77	88	0,049	17	962	47



# Dynamics of mineralization of humus of Leached chernozem, labeled C14, at application of NH<sub>4</sub>NO<sub>3</sub> and wheaten straw



## Strategy and tactics of farmers concerning humus of soils

1. It is necessary to organise of cultivation of cultures according to principles of soil-protective agriculture (prevention of erosive losses of soil).
2. It is desirable to cover in soil possible more share of the vegetative residues, formed in a crop rotation.
3. At planning of reception of top yields, it is desirable to estimate 1 time in 5 years quantity of labile organic substance in soil for specification of the minimum doses of the nitric fertilizers necessary for reception of planned crops.

I THANK  
FOR ATTENTION