

THE INFLUENCE OF METHODS OF SOIL BASIC PREPARATION, TYPE OF MULCH AND NORMS OF NITROGEN FERTILIZER ON THE DIFFUSION OF SUGAR BEET ROOT ROT DURING THE GROWING SEASON

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Combating with these diseases is of great importance, both in terms of obtaining high yields of sugar beet and from the point of view of combating with mass loss of roots during the storage period.

During the researches was established that the strongest influence on the prevalence level of sugar beet root rot during harvest provides the water and temperature regime (hydrothermal coefficient), in June and July – the correlation coefficient is 0.99 and 0.83, respectively. This demonstrates that due to the weather conditions in June and July, you can predict the spread of rot roots, which helps to correct the terms of sugar beet harvesting, reduce the losses during the storage period.

It was proved by the experiment that agrotechnical methods – the tillage methods – plowing or disking using mulch depending on the water and temperature conditions influence on the increase or decrease of the number of root rots.

The organic fertilizers applied under the preceding crop did not affect on the incidence of sugar beet root rot. During 2009-2011 it is amounted on average 28.6% on the background with manure and 28.7% on the background without manure. Usage of the different norms of nitrogen fertilizers (60-150 kg/ha) did not have a significant impact on the incidence of root rot.

During the growing season the sugar beet roots are affected by diseases, mainly rots caused by the defeat of various microorganisms – fungi and bacteria. The root rot development enhances under the influence of unfavorable soil and climatic conditions, the disturbance of mineral nutrition, the damage by insect is closely connected with the method of soil preparation.

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The researches on evaluating the influence of tillage methods, type of mulch and the methods of fertilizer application were carried out at the experimental field on RUE "Experimental Research Station of the sugar beet".

To assess the degree of weather conditions influence the conditional indicator – hydrothermal coefficient is used. To determine the degree of influence the hydrothermal coefficient on sugar beet rot incidence during the vegetation the correlation coefficient was used (Table 1).

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Table 1. Influence of weather conditions on the root rot spread

Month	Hydrothermal coefficient			Correlation coefficient
	2009	2010	2011	
May	1,9	1,7	1,1	0,65
June	3,5	1,7	1,6	0,99
July	2,1	0,6	1,5	0,83
August	0,8	1,0	1,0	-1,00
September	1,0	1,9	0,8	-0,40
Root rot spread, %	62,4	10,1	13,3	

The weather conditions in 2009 – torrential rains from the middle of May to July, accompanied by the decrease in temperature, then by its rapid growth, and also high temperature and humidity in July contributed to the strong development of the Black Leg, and during later terms to epiphytoty of stripline scab. In the current weather conditions in the variants with the using of mulch from oilseed radish (variant 2), mulch from straw and oilseed radish (variant 3) and on the background of straw mulch (variant 4) root rot incidence was lower than during the traditional tillage – on 10%, 7.4% and 10.3% respectively (Table 2).

The weather conditions in 2010 and 2011 were favorable for the sugar beet growth and development. During these years, the hydrothermal coefficient in June was 1.6-1.7, and in July and August in the most intensive phase of growth and development of sugar beet – 0.6-1.5, that led to a significant reduction of the spread of root rot. During the current weather conditions a tendency to increase of the prevalence of root rot in the variants with mulch from straw of preceding crop and oilseed radish was observed. On the background of plowing using mulch from oilseed radish a slight increase of the incidence of rot – by 0.3% in 2010 and 2.3% in 2011 was observed. On the background of disking in relation to the control variant the spread of rot was significantly higher and amounted 13-20,7%.

Table 2. The spread of sugar beet root rot during the growing season, %, 2009-2011

The method of soil tillage, source of obtaining mulch	2009		2010		2011	
	spread, %	+/- to standart	spread, %	+/- to standart	spread, %	+/- to standart
1. Plowing (standart)	69,3	-	8,3	-	7,7	-
2. Plowing + mulch from the oilseed radish	59,3	-10	8,6	+0,3	10,0	+2,3
3. Disking + mulch from oilseed radish and the straw of preceding crop	61,9	-7,4	10,5	+2,2	14,8	+7,1
4. Disking + mulch from the straw of preceding crop	59,0	-10,3	13,0	+4,7	20,7	+13,0

The organic fertilizers applied under the preceding crop did not affect on the incidence of sugar beet root rot. During 2009-2011 it is amounted on average 28.6% on the background with manure and 28.7% on the background without manure (Table 3).

Usage of the different norms of nitrogen fertilizers (60-150 kg/ha) did not have a significant impact on the incidence of root rot. Thus, if, with a 60 t/ha of manure and applying 60 kg/ha of nitrogen fertilizer the spreading of rot was 30.2%, during applying the same dose of nitrogen but without organic fertilizers – 29.3%. The similar results were obtained using other norms of organic and nitrogen fertilizers.

Table 3. The spread of sugar beet root rot depending on the norms of nitrogen fertilizers and organic fertilizers application, %, 2009-2011

Variants	The spread of sugar beet root rot, %	
	The average on the variant, %	The average on the background, %
N60 + manure 60 t/ha	30,2	28,6
N90 + manure 60 t/ha	27,9	
N120 + manure 60 t/ha	28,2	
N150 + manure 60 t/ha	27,9	
N60	29,3	28,7
N90	29,4	
N120	27,9	
N150	28,0	

Based on the aforementioned it can be concluded:

- In the conditions of Republic of Belarus the main factor that affects the development of the roots rot is the water and temperature regime in June-July.
- Using mulch from oilseed radish and (or) straw of the preceding crop, with hydrothermal coefficient more than 1.6 in June-July contribute to reduction of the prevalence of sugar beet root rot during the growing season. When the hydrothermal coefficient is less than 1.6 in June and July, using of mulch on the background of conservation tillage of the soil leads to the increase of incidence of root rot, on the background of plowing the increase of prevalence of root rot is negligible.
- The application of different norms of nitrogen fertilizers and manure under the preceding crop has no significant effect on the incidence of root rot.