Module 6.2-2 Zinc application method impacts winter triticale yield.

Arable soils in Omsk Oblast, Siberian Federal District of Russia, are very often deficient in available zinc (Zn) according to soil fertility surveys. A low level of available Zn was revealed in 2.9 million ha, or 99% of the arable land comprised by the recent regional soil survey. The region's meadow-chernozem soils (Gleyic Chernozems) generally have insufficient levels of available P; however, high rates of P fertilizers may contribute to Zn deficiency if soil available Zn is low.

Research experiments were conducted during 2007-2011 in experimental fields of the Siberian Research Institute of Agriculture. The soil was a clay loam with medium organic matter content (6 to 9%). Nitrate, available P and K were extracted with 2% acetic acid solution. Average initial contents of nitrate-N and available P (0 to 30 cm soil layer) were medium at 8 ppm NO_3-N and 4 ppm P, respectively. The average level of available K was 49 ppm, which falls within the "high" interpretation class. Available soil Zn extracted with ammonium acetate buffer solution (pH 4.8) was only 0.6 ppm Zn, which falls within the "low" category.

Fertilizer applications included basal rates of N applied as ammonium nitrate before tillage and a seed-placed P fertilizer as triple superphosphate. Two methods of zinc sulfate fertilizer application were studied:
1) basal application before tillage and
2) powdered seed treatment.

Field experiments revealed that winter triticale responds significantly to Zn fertilizer applied to meadow-chernozem soil low in available Zn. Both yield and quality of grain were improved with Zn application as shown in the table below. Soil application of Zn was generally more effective compared to seed treatment. The optimum Zn rates for soil application and seed treatment were found to be 8 kg Zn/ha and 100 g $ZnSO_4$/100 kg seed, respectively.

Application method and rate	Grain yield, t/ha	Yield increase		Test weight, g/L	Glassiness, %	Protein, %	Falling number, sec.
		t/ha	%				
$N_{30}P_{60}$	2.91	-	-	635	50	16.4	64
Basal application							
+ 4 kg Zn/ha	3.13	0.22	8	638	50	16.6	63
+ 8 kg Zn/ha	3.30	0.39	13	641	49	16.8	63
Seed treatment							
+ 50 g $ZnSO_4$/100 kg seeds	2.98	0.07	2	640	49	16.6	63
+ 100 g $ZnSO_4$/100 kg seeds	3.16	0.25	9	641	50	17.0	63

Note: Four-year averages (2008-2011) are given for grain yield and quality parameters.

References

Bobrenko I.A., N.V. Goman and E.Yu. Pavlova. 2013. Better Crops with Plant Food 3 (97): 21-23.

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