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Studies on the effect of applying fertilizer on *Pinus tabulaeformi* in Shen Dong Mine

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Key words: Shen Dong Mine, *Pinus tabulaeformi*, Applying Fertilizer, Shoot Growth, The diameter of pinus

Introduction Application of fertilizer to trees in an effort to increase their growth for protection from wind erosion and aesthetic value is low in our country but required (Chen Jun et al 1998, WuXiaofu et al 2002). Rates of greening in SHEN DONG Mine are 70 percent but the harsh nature of the environment seriously affects the normal growth of trees. This paper reports a study on the effect of increasing growth of *Pinus tabulaeformi* under the different fertilizer rates which will provide fertilizer recommendations for forestation.

Materials and methods The experimental area is located on ShenDong Mine in Inner Mongolia in the semiarid region of north China. We selected 7 kinds of fertilizer treatments: 1(CK), 2(urea 200g), 3(phosphate ammonium 500g), 4(sheep manure 2kg), 5(urea 100g, SSP 200g and potassium chloride 50g), 6(urea 200g, SSP 250g and potassium chloride 50g), and 7(sheep manure 2kg, urea 100g, SSP 200g and potassium chloride 50g). The amount of fertilization above was for one tree. There were 5 trees per treatment and 9 replicates. Each treatment is radial arranged. Specific fertilization methods are as follows: first, chemical fertilizer, stiletto 60 cm at each corner of tree well with Luoyang spade; second, organic fertilizer, embedding it in ringy ditch or radial ditch, the depth of ditch >40 cm. Fertilizers were applied in Autumn of 2003 and Spring of 2004. Diameter of pinus was measured by vernier caliper at September of 2003 (1 m above of ground) and signed, after that, measuring the diameter and shoot growth of *Pinus* at October of 2004 and September of 2005.

Results For shoot growth, in 2004, only the third treatment had a significant effect. In 2005, the fifth treatment significantly improved the shoot growth. For the diameter, there was no significant difference in 2004. In 2005, besides the third treatment being lower than the control, all of the others were significantly higher. In general, the compound fertilizer had a better effect than the single-effect fertilizer. The result of 2005 is better than 2004. The difference of diameter increment was higher than the difference of shoot growth. The amount of shoot growth in 2005 was 1.4 times of 2004 and the diameter increment is 2.3 times.

Table 1 Influence and variance analysis of *Pinus* growth amount under different fertilizer conditions in different years

Year	Growth amount Probability(P)	Treatment							Average
		1st	2nd	3rd	4th	5th	6th	7th	
2004	Shoot growth(cm)	19.4	19.9	13.8	17.9	18.6	17.8	17.3	17.8
	Probability(P)		0.5915	0.0054**	0.1716	0.61	0.1357	0.0707	
	Diameter(mm)	6	5.8	4.8	5.7	6.9	5.7	6.7	5.9
	Probability(P)		0.8613	0.3401	0.7693	0.3612	0.7693	0.5045	
2005	Shoot growth(cm)	24.3	25.6	22.4	25.4	28.6	24.1	25.8	25.2
	Probability(P)		0.6271	0.1359	0.3865	0.0145*	0.8095	0.1124	
	Diameter(mm)	12.6	13.8	10.8	13.2	14.5	14.4	16.3	13.7
	Probability(P)		0.016*	0.0252*	0.0408*	0.0043**	0.0082**	0.0002**	

Conclusions After fertilizer application, *Pinus*'s growth rate increased and the compound fertilizer had a better effect than the single one. An acceleration of was shown in the third year indicating a temporal effect, so, fertilizer could be applied earlier.

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