

Nutrient Retention Variation in Woodchip Fertilizers Treated with Compound Chemicals

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Objectives

Different types of fertilizers are largely being used in all around the world for successful crop production. Chemical fertilizers have some adverse effect on the environment if they are used indiscriminately. In this case, they are one of the major sources of soil and water pollution. No attempt was taken before for making woodchip fertilizer. This is the first time such research work has conducted for making an environmental friendly fertilizer. This research work was conducted based on compound chemicals which will allow woodchip to release N, P and K together from single woodchip. Here nutrient retention difference was observed when four kind of compound chemicals were used.

Materials and Methods

O Woodchip fertilizer

Five different kinds of woodchip were taken under consideration from *Pinus koraiensis* Sieb. et Zucc., *Pinus densiflora* Sieb. et Zucc., *Larix kaempferi* Carr., *Populus tomentiglandulosa* T. Lee and *Quercus* spp. Small diameter log of these five wood species were chopped into small pieces on an average size of 25mm x 15mm x 3mm. Four kinds of compound fertilizer solutions were used- [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]: 10(NH₄NO₃), [K₃PO₄: (K₂HPO₄): (NH₄)₃PO₄], [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]: 17(NH₄NO₃) and [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]. Compound fertilizer solutions were made by individual saturated solutions in definite amount and proportion.

O Estimation of nutrient content

Woodchip powder was made of woodchip fertilizer. From that powder, the percentage of nutrients N, P₂O₅, and K₂O were estimated by Kjeldahl, Vanadate method and using ICP (Leman LAB PS series PS-950) respectively. Finally data was analyzed by statistical software- SPSS version 11.5.0.

Results and Discussion

O The highest percentage of N (12.06%) was found in *P. koraiensis* woodchip. Highest amount of P₂O₅ and K₂O were obtained in *P. densiflora*. Lowest amount of N, P₂O₅ and K₂O were found in *Quercus* woodchip fertilizer (**Table 1**). Statistically no significant difference was found among the woodchip fertilizers in respect of nutrient content.

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O Besides four kinds of compound fertilizer solutions were used for making woodchip fertilizers. Nutrient content in woodchip fertilizers were affected by different compound fertilizer solutions being used. Highest amount of N (15.28%) was found when compound chemical 3 was used as stock solution. P₂O₅ (10.16%) and K₂O (13.1%) were found highest when compound chemical 4 was used (Table 2). Compound chemicals showed a significant difference for nutrient retention in woodchip fertilizers.

Table 1 Average nutrient content in woodchip fertilizers treated with different chemicals.

Name of species	N(%)	P ₂ O ₅ (%)	K ₂ O(%)	Total
<i>P. densiflora</i>	11.08	9.23	10.08	30.39
<i>P. koraiensis</i>	12.06	6.47	9.71	28.24
<i>L. kaempferi</i>	11.31	7.35	6.25	24.91
<i>P. tomentiglandulosa</i>	11.11	9.05	8.40	28.56
<i>Quercus</i>	7.41	5.39	5.00	17.8
	NS	NS	NS	

NS- Non Significant at 5% level of probability.

Table 2. Nutrient content in woodchip fertilizers affected by different compound chemicals.

Compound chemicals used	Nutrient content (%)			
	N	P ₂ O ₅	K ₂ O	Total
Compound chemical 1	10.72 b	4.59 b	5.05 b	20.36
Compound chemical 2	8.19 b	8.98 a	9.77 a	26.94
Compound chemical 3	15.28 a	6.25 ab	3.63 b	25.16
Compound chemical 4	8.19 b	10.16 a	13.1 a	31.45

In Duncan multiple comparison, mean with the same letter are not significantly different at p = 0.05.

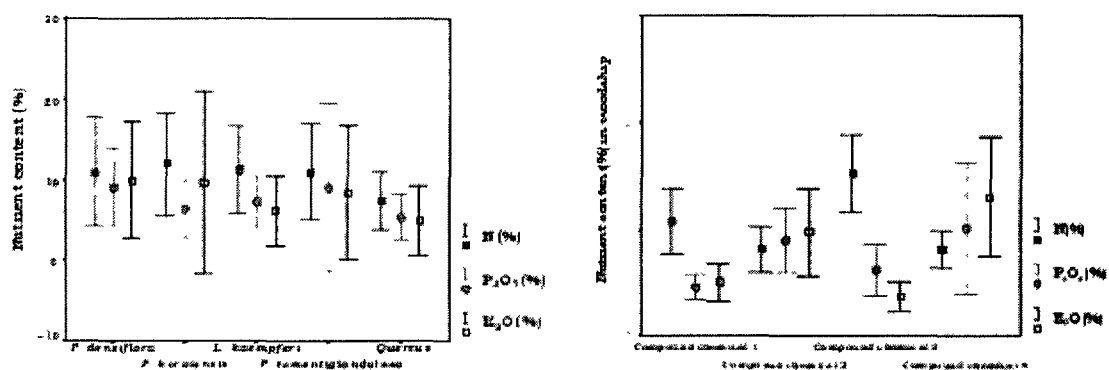


Figure 1. Error bar graph showing average nutrient content in different woodchip fertilizer and compound chemicals effect on nutrient retention in woodchip.

Compound 1: [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]: 10(NH₄NO₃)

Compound 2: 10(NH₄NO₃): [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]

Compound 3: [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]: 17(NH₄NO₃)

Compound 4: 17(NH₄NO₃): [K₃PO₄: 3(K₂HPO₄): (NH₄)₃PO₄]