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Karakterisasi faktor kemasaman dan pengaruh pemberian bahan amelioran untuk pertumbuhan tanaman pada tanah gambut ombrogen

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Abstrak

Tujuan penelitian ini adalah untuk mengetahui karakteristik faktor kemasaman dan pengaruh pemberian bahan amelioran terhadap pertumbuhan tanaman pada tanah gambut ombrogen. Penelitian ini dilaksanakan di lahan penelitian di Desa ...

Metode penelitian yang digunakan adalah metode kuadrat. Faktor kemasaman yang diteliti meliputi pH, kapasitas tukar kation (KTK), dan kandungan unsur hara. Bahan amelioran yang digunakan meliputi kapur, dolomit, dan pupuk kandang. Parameter pertumbuhan yang diamati meliputi tinggi tanaman, jumlah daun, dan luas daun.

Hasil penelitian menunjukkan bahwa faktor kemasaman tanah gambut ombrogen sangat masam (pH < 4). Pemberian bahan amelioran berpengaruh signifikan terhadap peningkatan pH tanah dan pertumbuhan tanaman. Kapur dan dolomit menunjukkan pengaruh yang lebih baik dibandingkan pupuk kandang dalam meningkatkan pH tanah.

Kesimpulan dari penelitian ini adalah bahwa pemberian bahan amelioran dapat memperbaiki kondisi kemasaman tanah gambut ombrogen dan meningkatkan pertumbuhan tanaman. Penggunaan kapur dan dolomit lebih disarankan untuk tujuan ameliorasi tanah gambut ombrogen.

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 SURABAYA



Pemberian CaCO_3 sebesar 8,5 ton/ha meningkatkan berat kering trubus dan akar serta tinggi tanaman, dan menurunkan konsentrasi Al dalam tanaman. Peningkatan berat kering trubus dan akar tanaman berturut-turut adalah dari 0,45 g/pot ke 37,15 g/pot dan dari 0,25 g/pot ke 15,64 g/pot, tinggi tanaman dari 59,92 cm ke 129,87 cm, dan penurunan konsentrasi Al dalam trubus dan akar tanaman berturut-turut dari 24,73 ug.g^{-1} ke 0,97 ug.g^{-1} dan dari 7,63 ug.g^{-1} ke 0,37 ug.g^{-1} .

Pemberian abu vulkan sebesar 40 ton/ha meningkatkan berat kering trubus dan akar, tinggi tanaman, dan menurunkan konsentrasi Al dalam tanaman. Berat kering trubus dan akar tanaman berturut-turut adalah sebesar 19,44 g/pot dan 5,57 g/pot, tinggi tanaman sebesar 106,17 cm, dan konsentrasi Al dalam trubus dan akar tanaman berturut-turut sebesar 3,37 ug.g^{-1} dan 4,67 ug.g^{-1} . Pemberian seresah jagung sebesar 20 ton/ha meningkatkan berat kering trubus dan akar dan tinggi tanaman, dan menurunkan konsentrasi Al dalam tanaman. Berat kering trubus dan akar tanaman berturut-turut adalah sebesar 0,95 g/pot dan 0,35 g/pot, tinggi tanaman sebesar 52,33 cm, dan konsentrasi Al dalam trubus dan akar tanaman berturut-turut sebesar 12,36 ug.g^{-1} dan 5,92 ug.g^{-1} . Pemberian seresah legum sebesar 20 ton/ha meningkatkan berat kering trubus dan akar dan tinggi tanaman, dan menurunkan konsentrasi Al dalam tanaman. Berat kering trubus dan akar tanaman berturut-turut adalah sebesar 1,02 g/pot dan 0,48 g/pot, tinggi tanaman sebesar 65,03 cm, dan konsentrasi Al dalam trubus dan akar tanaman berturut-turut sebesar 10,61 ug.g^{-1} dan 6,11 ug.g^{-1} .

Disimpulkan bahwa faktor kemasaman pada tanah gambut ombrogen saprik yang menghambat pertumbuhan tanaman adalah ion H^+ , Al total dalam larutan tanah (Al_T) dan Al monomerik (Al_{mono}).

Kata kunci : faktor kemasaman, amelioran, gambut ombrogen, jagung

AND THE EFFECT OF AMELIORANT APPLICATION FOR THE GROWTH OF PLANT ON OMBROGENOUS PEAT SOIL

ABSTRACT

A glasshouse experiment was carried out to determine acidity factor and the effect of ameliorant application for the growth of plant on ombrogenous peat soil, using corn (*Zea mays*, L.) as the test plant. The peat soil, taken from the top 30 cm, originated from the Kalamangan Village, Pangkaraya, Central Kalimantan.

The experiment was conducted using the complete randomized design (CRD) with four kinds of ameliorant, each applied at two levels. The ameliorant consisted of CaCO_3 at 6.5 and 8.5 ton/ha, volcanic ash at 0 and 40 ton/ha, corn plant material at 10 and 20 ton/ha and legume plant material at 10 and 20 ton/ha. A treatment without ameliorant application served as control. Basal fertilizer were applied to the soil in each pot. Each treatment had three replications. The method for analysis of total Al in soil solution (Al_T) and monomeric Al (Al_{mono}) used were the extraction by centrifugation (Gillman, 1976) and ultrafiltration according to Menzies *et al.* (1990). Corn stage, i.e. 55 days from planting.

The results showed that acidity factors in the ombrogenous peat soil consisted of pH of 3.21, total acidity of $10.79 \text{ cmol}(+)\cdot\text{kg}^{-1}$, exchangeable Al of $7.09 \text{ cmol}(+)\cdot\text{kg}^{-1}$, exchangeable H of $3.70 \text{ cmol}(+)\cdot\text{kg}^{-1}$, total Al in the soil solution (Al_T) of $15.21 \text{ ug}\cdot\text{g}^{-1}$ and monomeric Al (Al_{mono}) of $3.86 \text{ ug}\cdot\text{g}^{-1}$.

CaCO_3 application increased the pH of ombrogenous peat soil and decreased total acidity, exchangeable Al, exchangeable H, Al_T and Al_{mono} . Application of CaCO_3 at 8.5 ton/ha increased soil pH to 4.83, and decreased total acidity, exchangeable Al, exchangeable H, Al_T and Al_{mono} to $2.33 \text{ cmol}(+)\cdot\text{kg}^{-1}$, undetectable, $2.33 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $6.18 \text{ ug}\cdot\text{g}^{-1}$ and undetectable, respectively. Volcanic ash increased the pH and exchangeable H of ombrogenous peat soil and decreased total acidity, exchangeable Al, Al_T and Al_{mono} . Application of volcanic ash at 40 ton/ha increased soil pH to 3.94 and exchangeable H to $3.89 \text{ cmol}(+)\cdot\text{kg}^{-1}$, and decreased total acidity, exchangeable Al, Al_T and Al_{mono} to $9.67 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $6.68 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $7.08 \text{ ug}\cdot\text{g}^{-1}$ and undetectable, respectively. Corn material increased the pH and exchangeable H of the ombrogenous peat soil and decreased total acidity, exchangeable Al, Al_T and Al_{mono} . Application of corn material at 20 ton/ha increased soil pH to 3.60 and exchangeable H to $5.04 \text{ cmol}(+)\cdot\text{kg}^{-1}$, and decreased total acidity, exchangeable Al, Al_T and Al_{mono} to $8.87 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $3.74 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $8.59 \text{ ug}\cdot\text{g}^{-1}$ and $2.79 \text{ ug}\cdot\text{g}^{-1}$, respectively. Legume material increased the pH and exchangeable H of the ombrogenous peat soil and decreased total acidity, exchangeable Al, Al_T and Al_{mono} . Application of legume material at 20 ton/ha increased soil pH to 3.68 and exchangeable H to $7.53 \text{ cmol}(+)\cdot\text{kg}^{-1}$, and decreased total acidity, exchangeable Al, Al_T and Al_{mono} to $8.78 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $1.25 \text{ cmol}(+)\cdot\text{kg}^{-1}$, $8.59 \text{ ug}\cdot\text{g}^{-1}$, and $2.71 \text{ ug}\cdot\text{g}^{-1}$, respectively.

The application of CaCO_3 at 8.5 ton/ha increased the dry weight of plant tops and roots as well as plant height, and decreased Al concentration in the plant.



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Hasil penelitian menunjukkan bahwa faktor kemasaman tanah gambut ombrogen tergolong masam. Pemberian bahan amelioran berpengaruh signifikan terhadap pertumbuhan tanaman. Bahan amelioran yang digunakan adalah ...
Kata kunci: tanah gambut ombrogen, faktor kemasaman, bahan amelioran, pertumbuhan tanaman.

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Kata kunci: tanah gambut ombrogen, faktor kemasaman, bahan amelioran, pertumbuhan tanaman.



The increases in top and root dry weight were 1.15 g/pot and from 0.25 g/pot to 15.64 g/pot, respectively, plant height from 59.92 cm to 129.87 cm, and decreases in Al concentration in the tops and roots from 24.73 $\mu\text{g}\cdot\text{g}^{-1}$ to 0.97 $\mu\text{g}\cdot\text{g}^{-1}$ and from 7.63 $\mu\text{g}\cdot\text{g}^{-1}$ to 0.37 $\mu\text{g}\cdot\text{g}^{-1}$, respectively. Application of volcanic ash at 40 ton/ha increased plant top and root dry weight and plant height, and decreased Al concentration in the plant. Top and root dry weights were 19.44 g/pot and 5.57 g/pot, respectively, plant height was 106.17 cm, and Al concentration in the tops and roots were 3.37 $\mu\text{g}\cdot\text{g}^{-1}$ and 4.67 $\mu\text{g}\cdot\text{g}^{-1}$, respectively. Application of corn material at 20 ton/ha increased the dry weight of tops and roots and decreased plant height and Al concentration in the plant. Dry weight of tops and roots were 0.95 g/pot and 0.35 g/pot, respectively, plant height was 52.33 cm, and Al concentration in the tops and roots were 12.36 $\mu\text{g}\cdot\text{g}^{-1}$ and 5.92 $\mu\text{g}\cdot\text{g}^{-1}$, respectively. The application of legume material at 20 ton/ha increased the dry weight of plant tops and roots and plant height, and decreased Al concentration in the plant. Dry weight of tops and roots were 1.02 g/pot and 0.48 g/pot, respectively, plant height was 65.03 cm, and Al concentrations in the top and roots were 10.61 $\mu\text{g}\cdot\text{g}^{-1}$ and 6.11 $\mu\text{g}\cdot\text{g}^{-1}$, respectively.

It was concluded that acidity factors in the ombrogenous peat soil which impeded plant growth were H^+ ion, total Al in the soil solution (Al_T) and monomeric Al (Al_{mono}).

Keywords : acidity factors, ameliorants, ombrogenous peat, corn