

## Alfalfa Growth Response to Application of Cow Slurry

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### Summary

The effect of top-dressing cow slurry on the growth, yield, biological nitrogen fixation activity, and mineral content of alfalfa (*Medicago sativa* L. 'Hisawakaba VR') was investigated to establish useful method of slurry application to alfalfa grassland. Four L m<sup>-2</sup> slurry, which involved almost the same amount of phosphate and potassium as top-dressed chemical fertilizer, application at one top-dressing time caused the similar growth and yield of alfalfa to the case of top-dressing the chemical fertilizer. Top-dressing 8L m<sup>-2</sup> or 12L m<sup>-2</sup> slurry decreased the height and nitrogen content of alfalfa at the early re-growth stage.

When 8L m<sup>-2</sup> or 12L m<sup>-2</sup> slurry was top-dressed, the biological nitrogen fixation activity of alfalfa nodule was always low, which was evaluated by acetylene reduction method. The low activity of nodule was recognized in the soil with the high content of inorganic nitrogen, which was caused by the application of much slurry. The nodule activity did not recover when inorganic nitrogen reduced to scarce level by uptake of alfalfa and nitrate leaching.

The nitrate concentration of alfalfa in the case of slurry application was beyond the critical level to cause the nitrate toxic symptoms for livestock. But in the case of 4L m<sup>-2</sup> slurry application, the nitrate concentration decreased under the critical level at the harvest season. Much slurry application would cause the accumulation of nitrate in soil and the depression of biological nitrogen fixation

activity, and would result in the increase in nitrate uptake of alfalfa.

The calcium, magnesium, potassium and phosphate concentration of alfalfa was in the range of proper level with or without slurry application. The sodium concentration increased by slurry application. Exchangeable potassium accumulated in the soil with slurry application at the rate of 8L m<sup>-2</sup> or 12Lm<sup>-2</sup> and exchangeable sodium accumulated in the all soil with slurry. The accumulation of exchangeable potassium in soil by much slurry application may be increase potassium concentration over the critical level of alfalfa in the near future.

In conclusions, too much slurry should not be applied to alfalfa grassland. Slurry application, if the input of phosphate and potassium by the slurry application is as large as one by standard top-dressing with chemical fertilizer, would cause standard yield without too high nitrate concentration of alfalfa and the potassium accumulation in soil.

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