COMMUNICATION II

Effect of Air-Flow Rates on Laboratory Measurement of NH₃ Volatilization

ABSTRACT

The effect of air-flow rates on the volatilization loss of NH₃ from urea was studied on two soil types. In both soils, the volatilization loss increased with increasing air flow rates up to 14 volume/min. Further increase in air-flow rate to more than 14 volume/min. did not significantly increase volatilization loss of NH₃. It is suggested that volatilization loss should be measured at an air flow rate of 14 volume/min.

INTRODUCTION

Ammonia volatilization loss from urea applied to soil surface is affected by wind speed; the loss increases with increasing air-flow rates, (Bouwmeester and Vlek, 1981; Fillery et al., 1984; Denmead et al., 1977). Results on NH₃ loss measured under laboratory conditions have been inconsistent. The discrepancies were mainly due to methods of measurement. On most cases, it can be attributed to differences in air-flow rates. It is necessary therefore, to establish a suitable air-flow rate for laboratory measurement of NH₃ volatilisation loss so that results obtained would be consistent.

The objective of this work is to study the effect of air-flow rates for measurement of NH₃ loss from urea in the laboratory.

MATERIALS AND METHODS

The study was carried out on two soils viz; Serdang series (Typic Paleudult) and Holyrood series (Oxic Dystropept) collected at 0–15 cm depth. Their properties are presented in Table 1.
Some physical and chemical properties of the soils used in the study.

<table>
<thead>
<tr>
<th>Characteristic</th>
<th>Serdang</th>
<th>Holyrood</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clay (%)</td>
<td>25.6</td>
<td>21.2</td>
</tr>
<tr>
<td>Silt (%)</td>
<td>7.4</td>
<td>10.9</td>
</tr>
<tr>
<td>Fine sand (%)</td>
<td>13.9</td>
<td>25.0</td>
</tr>
<tr>
<td>Coarse sand (%)</td>
<td>35.1</td>
<td>42.9</td>
</tr>
<tr>
<td>CEC (meq/100 g. soil)</td>
<td>6.7</td>
<td>6.0</td>
</tr>
<tr>
<td>pH (H₂O)</td>
<td>4.5</td>
<td>4.4</td>
</tr>
<tr>
<td>Organic carbon (%)</td>
<td>1.3</td>
<td>1.9</td>
</tr>
</tbody>
</table>

![Diagram](image)

Figure 1: A diagramatic sketch of the volatilisation apparatus used in the study.

Figure 2: The effect of air-flow rate on volatilisation loss of urea.

RESULTS AND DISCUSSION

The effect of air-flow rates on NH₃ loss by volatilisation is shown in Fig. 2. In both soils, volatilization loss increased with an increase in air-flow rate until the air-flow rate was 14 volume/min., after which there was no further significant increase.

Thus, although the rate and amount of urea volatilized in these two soils were different, the maximum air-flow rate was similar. It is suggested that for measurement of NH₃ volatilisation.
EFFECT OF AIR-FLOW RATES ON LABORATORY MEASUREMENT OF NH₃ VOLATILIZATION

Volatilization from urea in the laboratory, an air-flow rate of more than 14 volume/min. should be used so that the volatilization is at the maximum and less variable.

If measurement at 14 volume/min. is not possible, the air-flow rate used should be reported and kept constant for all measurements. The maximum air-flow rate obtained in this study was comparable to the results obtained by Kissel et al., (1977).

CONCLUSION

The amount of NH₃ volatilization loss was affected by air-flow rates. The loss increased with air-flow rate up to 14 volume/min. It is suggested that measurement of NH₃ volatilization from urea in the laboratory is made with an air-flow rate of 14 volume/min. or more.

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REFERENCES


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