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Evaluation of *Mimosa pudica* and *Mimosa pigra* as green manure for agricultural production

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Due to the ongoing energy crisis and rising fertilizer input cost, there is renewed interest in organic manuring for agricultural production. Commonly used organic manure sources include farmyard manure and green manure prepared from nitrogen-fixing legumes. This work investigates two nitrogen fixing shrubs for N accumulation, N release patterns upon soil incubation and their effect of released N on plant growth. The two plants used belong to genus *Mimosa* namely *M. pudica* and *M. pigra*. The selection of these leguminous plants was based on their ability to form symbiotic relationships with nitrogen-fixing bacteria and capability to convert atmospheric nitrogen into ammonia, a valuable source of nitrogen that can be used as green manure. *Mimosa* plants were cut and separated into leaves, stems, and roots. The available ammonium N and nitrate N content in each plant part was determined by Kjeldahl method and nitrate ion selective electrode. Their capacity to release usable N into the soil was determined by incubating plant parts with soil in litter bags under aerobic conditions. The efficacy of the green manure on plant growth was determined by pot experiments and the data were statistically analyzed. The leaves of *M. pudica* showed the highest amount of ammonium nitrogen ($2.05 \pm 0.40\%$), while the roots of *M. pigra* showed the highest amount ($0.79 \pm 0.13\%$). The leaves of *M. pudica* ($0.03 \pm 0.01\%$) and roots of *M. pigra* ($0.03 \pm 0.01\%$) showed the highest amount of nitrate nitrogen. When the plant parts were cut, separated, and incorporated into the soil for a period of 24 weeks, the rate of N mineralization increased the ammonium and nitrate nitrogen availability. *M. pudica* showed an increase of ammonium N from ($0.190 \pm 0.032\%$ to $0.66 \pm 0.10\%$), while *M. pigra* showed an increase from ($0.12 \pm 0.03\%$ to $0.73 \pm 0.04\%$). The incorporation of these plant parts into soil planted with *Capsicum annuum* (Chilli plant) in a pot experiment bioassay showed a discernible effect on plant growth. Notably, the incorporation of *M. pudica* leaves (34.3 ± 0.5 cm) and *M. pigra* leaves (30.5 ± 0.2 cm) resulted in greater plant heights compared to the control group (16.2 ± 0.1 cm), which resulted in significant differences (p value, $0.024 < 0.05$) in plant growth. The findings of the study suggest that the plant segments of *M. pudica* and *M. pigra* possess a substantial quantity of nitrogen that can be effectively utilized. Hence, these plants possess the potential to serve as a viable green manure resource.

Keywords: Green manure, Leguminous plants, *Mimosa*, Nitrogen fertilizer, Sustainable agriculture, Soil fertility