of available N that would, under normal conditions, be continually removed by uptake or transported away, makes the method ideal for estimating net N mineralization in either agricultural or forest soils, and there has been a large increase in the use of polyethylene bags for a variety of soils research (cf., Fahey et al., 1985; Gordon et al., 1987).

Of critical importance when using polyethylene bags to estimate net N mineralization is the maintenance of similar conditions within the bag that will allow ammonification and nitrification to proceed. This is obviously related to many factors, the most important of which is likely the thickness of the polyethylene bag employed. These were the general conclusions of Douglas (1971), who also cautioned that the permeability of polyethylene to CO\(_2\) and O\(_2\) exchange decreased as bag thickness was lowered. This fact alone has severe implications for workers utilizing the method in cold soils, even though ironically, Eno (1960) suggested that the method was best suited for situations where soils were frozen for a substantial portion of the growing season. Under those circumstances, the bag method would be of considerable value in evaluating nitrification rates.

Despite questions on the effect of bag thickness on processes being monitored, researchers have employed a variety of bag thicknesses in their studies. They often cited Eno (1960) who did not specifically make recommendations about the thickness of bags utilized. A recent survey of 40 journal papers published since 1980 that utilized polyethylene bags or films for soil incubations indicated an increase in the use of polyethylene bags or films with the years. Researchers varied from 0.006 mm (Drost et al., 1980) to 0.1 mm (Federer, 1983) (0.24 to 4.0 mils, respectively). More importantly, many researchers have continued to employ varied bag thicknesses, ranging from 0.015 to 0.032 mm (0.6 to 1.25 mils). Researchers have observed that the standard thickness (0.025 mm), indicated in many of the studies, is not always suitable because it is considered to be of local or regional interest.

For pedology to remain a viable science we need both field and laboratory scientists that have strong academic backgrounds. We need to understand the processes and dynamics of the system responsible for soil properties and distribution. Field work helps develop this understanding. Environmental problems involving soils and landscapes are an important part of soil science. All environmental problems are at scales larger than a pedon or soil sample and require an understanding of soil dynamics and geography. I doubt that laboratory scientists can consistently furnish good answers without additional field data. Geologists and engineers will provide answers if we do not. We may not like this, but someone must and will fill the void the pedologist leaves.

If pedology becomes a laboratory science, soil science loses the one subdiscipline that makes it unique. Most other soil science subdisciplines can easily fit into other departments, as can a “laboratory pedologist” (an oxymoron). The question remains, can both field and laboratory soil science be made strong within the university system? Prospects seem poor at present. One possibility may be to transfer pedologists to earth science departments where the emphasis is on field work. With this alternative, however, we will soon lose professional contact with our soil science colleagues. Cooperative efforts among pedologists and other soil scientists would decrease as would an integrated understanding of soil science. Another possibility could be to develop cooperative programs with Federal agencies that allow a graduate student, and professors on sabbatical leave, to work without interruption for 1 or 2 yr on field projects of mutual interest.

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References

Recent research on polyethylene bags in controlled environments (Gordon et al., 1987) indicated that soils thickened significantly when nitrogen was added, but polyethylene bags varied from 0.015 to 0.032 mm (0.6 to 1.25 mils). These bags were tested (5 to 25 °C). In addition, all thicknesses of bags remained impermeable to H\(_2\)O loss and permeable to CO\(_2\). Regardless of temperature, the latter was present as high CO\(_2\) production.

I would like to encourage researchers who utilize polyethylene bags or films for soil incubations to consider the thickness of bag used. As a standard to employ I would like to suggest utilization of polyethylene bags 0.025 mm (1.0 mil) thick. Bags <0.015 mm in thickness should be avoided due to the potential for expansion into the bag. Where bags 0.025-
mil thick are used, the possibility exists for overestimation of net N mineralization.