

Development of Soil Test Kits to Determine Organic Matter Available Phosphorus and Exchangeable Potassium in Thailand

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Abstract : Soil test kits for rapid analysis of the organic matter, available phosphorus and exchangeable potassium were developed to drive a low-cost field testing kit to farmers. The objective was to provide a decision tool for improving soil fertility. One aspect of soil test kit development was ease of use which is a time requirement for completing organic matter, available phosphorus and exchangeable potassium test in one soil sample. This testing kit required only two extractions and utilized no filtration consuming approximately 15 minutes per sample. Organic matter was principally created by oxidizing carbon KMnO_4 using the standard color chart. In addition, modified single extractant (Mehlich I) was applied to extract available phosphorus and exchangeable potassium. Molybdenum blue method and turbidimetric method using standard color chart were adapted to analyze available phosphorus and exchangeable potassium, respectively. Modified single extractant using in soil test kits were highly significant matching with analytical laboratory results ($r=0.959^{**}$ and 0.945^{**} for available phosphorus and exchangeable potassium, respectively). Linear regressions were statistically calculated between modified single extractant and standard laboratory analysis ($y=0.9581x-12.973$ for available phosphorus and $y=0.5372x+15.283$ for exchangeable potassium, respectively). These equations were calibrated to formulate a fertilizer rate recommendation for specific corps. To validate quality, soil test kits were distributed to farmers and extension workers. We found that the accuracy of soil test kits were 71.0%, 63.9% and 65.5% for organic matter, available phosphorus, and exchangeable potassium, respectively. The quantitative survey was also conducted in order to assess their satisfaction with soil test kits. The survey showed that more than 85% of respondents said these testing kits were more convenient, economical and reliable than the other commercial soil test kits. Based upon the finding of this study, soil test kits can be another alternative for providing soil analysis and fertility recommendations when a soil testing laboratory is not available.

Keywords : available phosphorus, exchangeable potassium, modified single extractant, organic matter, soil test kits

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