Division: Remote Posters
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Reducing Phosphorus Application Rate to Greenhouse Cucumber Using a Safe, Simple, and Inexpensive Soil Test.

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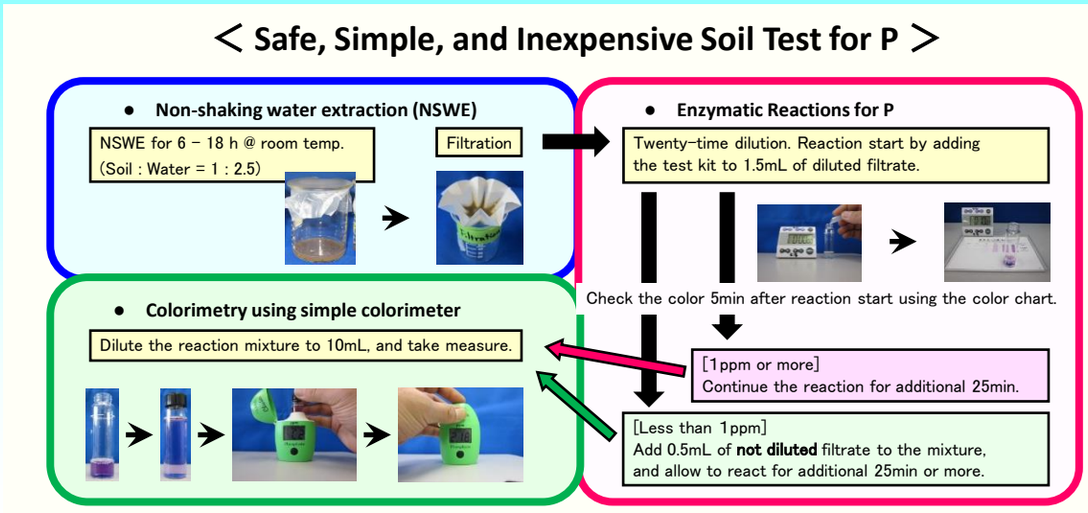
[Background and Objectives]

In response to recent price increases of fertilizers, soil testing is being further promoted throughout Japan. We previously developed a new on-farm soil testing method that consists of non-shaking water extraction (NSWE), enzymatic reactions, and colorimetry for extracted phosphorus (P) analysis (see below).

As an example, we describe the use of this method for selecting the basal application rate of P to greenhouse cucumber, a crop that is receiving P fertilizers at one of the highest rates in Japan.



[Materials & Method]

Calibration tests for NSWE were carried out in test fields at the agricultural technology centers in Gunma, Kanagawa, and Kochi Prefectures. In Kanagawa and Kochi Prefectures, additional tests were performed on professional farms. Experimental conditions varied among prefectures, but each field reflected the typical conditions for that prefecture. For example, cucumbers were harvested either once or twice a year, and the most popular cultivars in each region were selected for the tests. Because of the laborious nature of the calibration tests, especially for continuous fruit-producing crops like cucumber, we used a small number of treatment plots and focused on identifying the critical soil NSWE-P level that would allow farmers to omit the basal P application, which accounts for about 50% to 90% of the total P application rate.

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[Results]

In each calibration test trial, no significant difference in yield was observed between the no basal P (NBP) plots and the controls (typical conditions). However, yield decreases were frequently observed in the NBP treatments at NSWE-P levels of 1.00 mg P_2O_5/100 g air-dried sieved soil and below, when the results of all test trials were combined by the relative yields (NBP/control).

Because of the suggested risk of yield loss at this level and below, the value was deemed as the critical NSWE-P for NBP, although the degree of yield loss was not great.

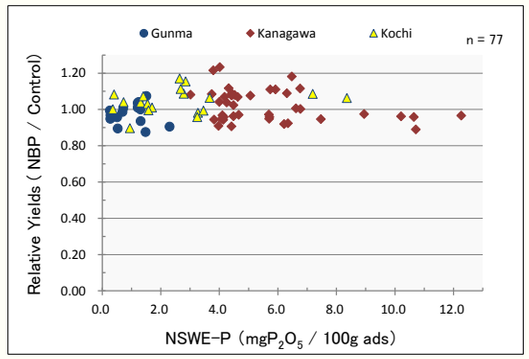

Figure 1 Relative yields in calibration test trials.

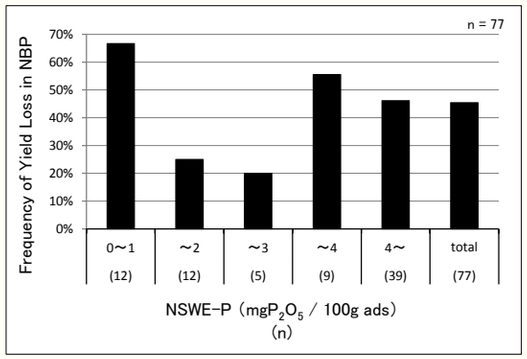

Figure 2 Frequency of yield loss in NBP.

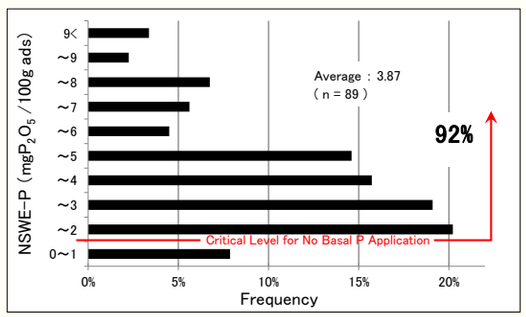

Figure 3 P accumulation in professional farms.

More than 90% of the topsoil samples, collected from greenhouses for cucumber, contained more P than the critical level for NBP, suggesting NBP culture would be possible in fairy large number of farms.

Cost saving effect by NBP was roughly estimated at around 30% reduction in total cost, when compared to the typical cases.

[Conclusion]

In greenhouse cucumber culture, NBP can be carried out without significant yield loss, where phosphorus is accumulated over 1.00 mg P_2O_5/100 g air-dried sieved soil evaluated as NSWE-P.

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