Agnote

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Collecting Field Crop Samples for Analysis

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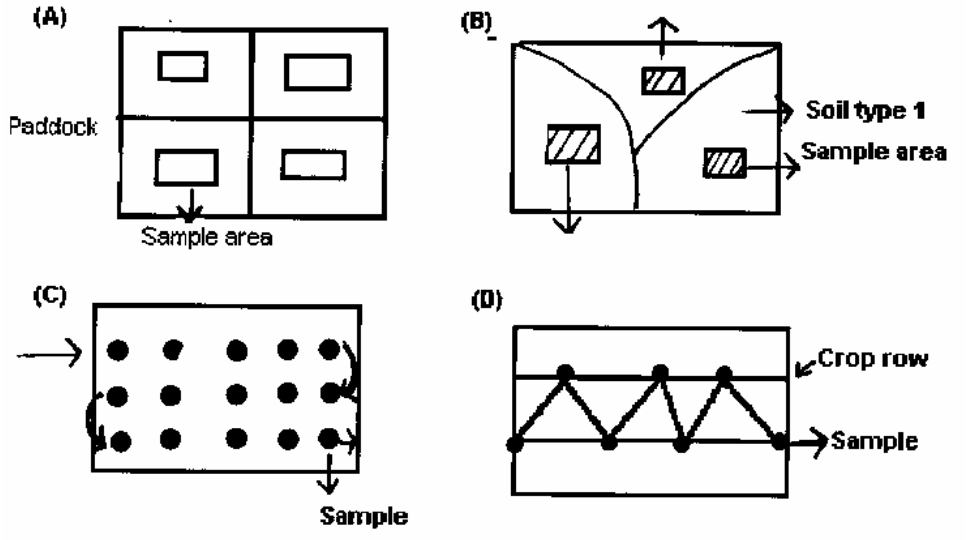
INTRODUCTION

Nutrient stress is one of the major natural constraints to crop production in the Northern Territory, while fertilisers constitute a major cost of production. To practise efficient and economical crop production you will need information about the nutrient status of your crops. The economic return from a crop is largely determined by its yield and quality and its growing costs, all of which are directly related to its nutrient status. Plant analyses provide information about possible deficiencies or toxicities of essential nutrients. They measure the concentration of essential nutrient elements in plant tissues and provide a simple, fast and relatively inexpensive means of evaluating the nutrient status of crops. Plant analysis is based on the concept that the concentration of a nutrient element in a plant, or a part of a plant, is an indication of the supply of the element to the plant. By reference to established standards it is possible to indicate whether the nutrient in a crop falls in the normal, toxic or deficient ranges or if there is an imbalance between nutrients.



Figures A and B show paddock and sample area (Ref: Reuter and Robinson). Figures C and D show method of sampling.

Plant tissue analysis is only one of the diagnostic tools used in nutritional problem-solving or advising. Generally it should be used in conjunction with soil analysis, careful observation of the crop and environmental conditions, and the information about the previous crop and paddock history. The Department currently provides a plant analysis service but producers must understand and follow certain procedures when collecting and preparing samples if the service is to provide worthwhile results.

THE PURPOSES OF PLANT ANALYSIS

1. To diagnose or confirm visual deficiencies or toxicity problems.
2. To identify deficiencies where nutrient levels are low enough to reduce potential yield but not low enough to produce deficiency symptoms.
3. To maintain or improve the balance of different nutrients.
4. To provide a basis for the compilation of a fertiliser recommendation.
5. To monitor the outcome of fertiliser applications and appropriateness of fertiliser recommendations.
6. To predict whether nutrient deficiencies are likely to occur in the current, or succeeding crops.
7. To estimate the removal of key nutrients by a crop with a view to replacing them and maintaining fertility.
8. To estimate the nutritional value of a crop to the animal or human consumer.

HOW YOU SHOULD TAKE SAMPLES

Plant tissue analysis is done on whole plant samples or from plant parts (petiole, stem or leaf). If done at the early stage of growth it will be useful to correct any current deficiency. However, if done at flowering the information will be useful for the next season's crop. The sample collected should represent the area of the crop or the paddock. The person sampling should judge and collect adequate plants or plant parts to represent the total plant population. For diagnostic samples when a deficiency is suspected, separate samples should be collected from the "deficient" and "normal" areas. Where a crop is uniformly affected one sample representing the affected area is sufficient. It is important to collect the samples when the deficiency symptoms are first observed. For crop nutrient monitoring the field should be roughly divided into two or four sections and each section should be sampled systematically as illustrated in Figures A and B.

The quality of the sample collected and submitted will directly affect the quality of the analysis and the advice you receive. Therefore samples must be truly representative of your conditions, be unaffected by items that may produce spurious results and be supplemented with information that facilitates interpretation of results. It is important to consider and record the following factors before sampling:

1. Describe the crop species and variety, soil type, sampling site location, observed symptoms, previous crop and fertiliser history.
2. Do not collect plant or plant parts which are dry or dead, mechanically damaged or attacked by insects or diseases.
3. Do not take samples when the plants are under moisture stress i.e. when the plants are exposed to prolonged dry spells or when the day temperatures are high.
4. Collect samples between 8 and 11 a.m.
5. Use gloves or at least wash your hands to avoid contamination of a sample until it is placed in a clean bag or other container.
6. Avoid collecting samples near roads, cattle pads or camps, trees or waterlogged areas, or other abnormal sites.

WHEN AND WHAT YOU SHOULD SAMPLE

As the crop develops changes occur in the concentration of nutrients in the whole plant and in its parts. Therefore, in order to accurately interpret the results of plant analysis, it is essential to know the stage of crop growth when the sample was collected. Samples are generally collected at standard, defined stages of crop or physiological age. Plant samples for most of the field crops for monitoring should be collected at the active vegetative stage (generally four weeks after sowing) and/or flowering. Stage of growth and plant part for sample collection for some of the field crops is as shown in Table 1.

HOW TO PREPARE YOUR PLANT SAMPLE

The plant sample will need to be properly processed before it is submitted for chemical analysis. Remember it is still alive and can be easily contaminated or the chemical composition of some elements changed. The following steps are required.

1. Place the collected sample in a labelled, open paper bag and place it in an esky or cool container or car fridge or water tight bag. Do not leave samples in open bags or in the car for long periods of time and get them to the laboratory at Douglas Daly Research Farm or Katherine or Berrimah for further processing within 24 hours. Be careful that the correct sample is placed in the correct bag. Double check as mistaken identity will invalidate the test and waste your time and the chemist's efforts.
2. In an accompanying note describe the crop species and variety, soil type, symptoms and previous crop and fertiliser history.

Table 1. Stage of growth and plant part for sample collection for some field crops

Crop	Age or stage of growth	Plant part to sample	Number of plants or leaves
Sorghum	Vegetative* Flowering	Whole plant Second leaf	20-30 25-30
Maize	Vegetative* Flowering	Whole plant Blade opposite below cob	20-30 25-30
Rice	Vegetative* Flowering	Whole plant The forth uppermost leaves	25-30 50-100
Soybeans	Vegetative* Flowering	Whole plant Youngest fully expanded leaf**	25-30 50-100
Sesame	Vegetative* Pre or at flowering	Whole plant Youngest fully expanded leaf	25-30 50-100
Mungbeans	Vegetative Flowering	Whole plant Youngest fully** expanded leaf	25-30 50-100
Peanut	Vegetative Flowering	Whole plant Youngest fully** expanded leaf	25-50 50-100

* Generally 25-30 days after sowing
** Recently matured

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