

2 DATA COLLECTION

This chapter outlines the information that needs to be collected in order to develop a Nutrient Management Plan. In many cases, this information will be collected during the site visit that is done as part of developing an Environmental Farm Plan. In other cases a follow-up visit may be required. The data that is collected will later be used in the calculations that are performed to assess current practices and make recommendations for future improvements.

Table 2.1 summarizes the information needed for different cropping scenarios.

	Forage	Field Vegetables	Raspberry Blueberry	No Land Application[^]
Field information	✓	✓	✓	
Soil tests	✓	✓	✓	
Crop or tissue tests	✓ [†]	✓ [†]		
Manure tests	✓	✓ [*]	✓ [*]	
Manure imports and exports	✓	✓ [†]	✓ [†]	✓
Livestock / animal information	✓			✓
Manure application method	✓ [*]	✓ [*]		
Manure storage system: other inputs	✓ [†]			
Grazing information	✓ [†]			

[^] farms that generate manure and export all of it from the farm

^{*} required if manure is applied

[†] optional: see details below

If there will be no land application of fertilizers or manure, the objective of the planning process is to document the amount of manure to be exported from the farm on which the manure is generated. The Forage NMP Calculator (Chapter 4) can be used with only the information required according to Table 2.1.

FIELD INFORMATION

For each field on the farm, information is needed on field size and field history.

For the purposes of a Nutrient Management Plan, a field should be a soil sampling unit identified by the following characteristics:

- It has the same cropping rotations, anticipated yields, and tillage
- It is normally no larger than 10 hectares (25 acres) in size. It can be larger if the characteristics and management of the field is known to be uniform from previous soil testing and records.

- It is the realistic area on which nutrients will be applied. If permanent setbacks are maintained adjacent to sensitive watercourses or wetlands, this area should be subtracted from the total acreage of the field.

Field history information should be provided for the 3 most recent cropping seasons. Factors to consider include the following:

- Fertilizer and manure application rates and frequency
- Cover crops, considering the presence of nitrogen-fixing legumes

SOIL, CROP AND MANURE INFORMATION

The nutrient balancing process requires information on soil nutrient reserves, manure nutrients, and anticipated crop nutrient uptake. This information requires collecting and submitting representative soil, manure and crop samples to a laboratory for analysis.

If sampling protocols used differ from those in the sampling factsheets, this information should be included along with laboratory reports in the Nutrient Management Plan.

Soil. A representative soil sample should be collected from each field. Following laboratory analysis, the soil test values will be used as a snapshot of available nutrient levels in the soil and to determine what level of additional nutrients may be required. See guidelines in **Factsheet 2**.

Crop. For each crop grown, the anticipated crop yield should be identified. Where accurate records have been kept, it is best to determine yield based on historical on-farm yields. As yields fluctuate from year to year, it is recommended to take the average yield for the past 3 to 5 year period. If on-farm records are not available, local historical yield averages may be available from the regional agronomist in the area or from other local industry experts.

With **forage crops**, an analysis of forage quality for protein, phosphorus and potassium content is recommended. Book values are provided for reference; it is recommended that farm or field-specific values will be taken. See guidelines in **Factsheet 4**.

With **field vegetables**, usually only a portion of the crop is harvested. By default, book values are used in the Vegetable NMP Calculator for several crops, and crop tissue analysis of the harvested portion can be used to get farm or field-specific values to assess crop removal.

With **raspberries**, a visual assessment of primocane vigour is used instead of crop tissue testing. This assessment is best done in the fall. The farmer and Planning Advisor should subjectively rank the vigour as excessive, normal or weak, based on the primocanes' appearance: thicker canes, longer canes, more canes and darker green shades indicate greater vigour.

Tissue testing can also be done to assess whether there are deficiencies or surpluses of nutrients. This approach is more advanced with some crops than others and it is currently beyond the scope of the Nutrient Management Plan.

Manure. If manure is generated or land-applied on the farm, a representative manure sample should be collected and analyzed for nutrient contents for each manure storage facility that provides manure to be applied. See guidelines in **Factsheet 5**.

The items identified below are the requirements (and recommendations where noted) to use the NMP Calculator software:

Soil Analysis

The following soil tests should be included for a spring soil sample (0-15 cm) for **forage** and **field vegetable** crops.

- available phosphorus (P)
- available potassium (K)
- nitrate-nitrogen (NO₃-N)
- ammonium-nitrogen (NH₄-N) – recommended
- pH – strongly recommended if soil pH has not been measured in the last three years or if the Planning Advisor is uncertain if pH is less than or greater than 7.2

The following soil tests should be included for **raspberries** and **blueberries**:

- available phosphorus (P), sample depth (0-15 cm)
- available potassium (K), sample depth (0-15 cm)
- post-harvest nitrate-nitrogen (NO₃-N), sample depth (0-30 cm), *raspberries only*. Soil samples should be taken after crop harvest between approximately August 15th and September 1st. A spring soil test is not used to assess nitrogen fertility levels of a raspberry field.

The Planning Advisor should note the extraction methods used for soil test phosphorus and potassium (as described in Factsheets 1, 2 and 3).

Crop or Tissue Analysis

- crop protein or nitrogen content (N)
- crop moisture content
- crop phosphorus content (P)
- crop potassium content (K)

For forage crops, it is strongly recommended that farm or field-specific values are used from averages over recent years if not from the previous year.

For field vegetables, average N, P and K contents of many crops are provided in the NMP software. Tissue testing of the plant material that is harvested will give farm or field-specific values.

 For average N, P and K content of crops not listed in the NMP software, go to the USDA **Crop Nutrient Tool** at <http://plants.usda.gov/npk/main>

For berries, tissue testing is not part of the nutrient management planning process at this time. Crop tissue testing for these crops has been developed outside of BC but because applicability to local conditions is unclear, the following resources are provided for interest only at this point:

📖 **Caneberries Nutrient Management Guide:** available on the <http://extension.oregonstate.edu/catalog/html/em/em8903-e/>

📖 **Nutrient Management for Blueberries in Oregon:** available at <http://extension.oregonstate.edu/catalog/pdf/em/em8918.pdf>

Manure Analysis

- total nitrogen (N or TKN)
- ammonium nitrogen (NH₄-N)
- nitrate-nitrogen (NO₃-N) – optional for composts
- total phosphorus (P)
- total potassium (K)
- total solids or dry matter (TS or DM), or moisture (MC)

Frequency of Sampling

The quality of a Nutrient Management Plan depends in part on how realistic the values are for the soil, crop and manure analysis. Ideally, analysis will be based on samples collected in the current year, particularly the first time a Nutrient Management Plan is being done.

In subsequent years, the following sampling frequency is recommended.

Soils

- at least every three years
- more frequent sampling is recommended if the soil is coarse-textured or if crops have been grown that are heavy users of nutrients
- annual pre-sidedress (mid-season) and post-harvest soil nitrate testing is recommended for certain cropping situations – see Chapter 6: Record Keeping and Monitoring

Crops

- for each harvest in the first year of the plan
- if numbers appear stable, reduce frequency in future years

Manure

- at least once a year
- more frequent sampling is recommended if moisture content changes significantly throughout year – typically at least one sample to represent spring applications and one for summer applications
- if values appear stable after 2 to 3 years of sampling, reduce frequency

MANURE IMPORTS AND EXPORTS

Estimate the volume of manure that will be imported to the farm and exported from the farm on an annual basis. If the manure imported is significantly different from other manures being managed on the farm, a manure nutrient analysis is also recommended.

For operations that transport manure on or off the farm, this information is used to account for the movement of nutrients contained in this manure.

For **field vegetables and raspberries/blueberries**, the volume of manure does not have to be estimated during the data collection phase if it is a value that will be determined using the NMP Calculators and included in the Conclusions and Recommendations of the Nutrient Management Plan.

LIVESTOCK / ANIMAL INFORMATION

For livestock and poultry farms, an inventory of the number of animals of each type should be collected. If the numbers fluctuate during the course of the year, the average number should be used. For each livestock group, state whether the manure is handled as a liquid or solid.

For dairy animals, also specify the numbers by age group, the breed and average milk production per milked cow if available.

This information will be used to estimate the volume of manure that is generated on the farm.

MANURE APPLICATION METHODS

Manure spreading practices and soil and weather conditions affects the ammonia (nitrogen) loss during and after manure application.

Find out what manure spreading equipment is used, at what times of year manure is typically applied, and typical spreading rates.

INFORMATION FOR ESTIMATING OTHER INPUTS TO MANURE STORAGE SYSTEM

This information is used primarily for dairy farms, and is used to best estimate volumes of rainwater, washwater and other possible inputs into a manure storage system. Information that needs to be collected includes the following:

- ▶ Dimensions of all unroofed manure storage facilities
- ▶ Dimensions of all outside yard areas from which runoff drains into manure storage facilities
- ▶ Dimensions of all roofs from which runoff enters manure storage facilities
- ▶ If a solid/liquid separator is used, an estimate of the percentage of the total liquid manure volume that is diverted to the solid manure volume.
- ▶ For dairy systems, a measurement of daily milkhouse and parlour washwater usage. The following tips can help with this estimate.
 - For pipeline washing, determine the volume of water used per wash or rinse cycle and multiply by the number of cycles run per 24 hour period.

- For bulk tank washing, determine volume of water used for all wash and rinse cycles for every milk pickup cycle. If milk is picked up every second day, divide estimate by two.
 - For estimating washwater used to hose down the parlour or holding areas, measure how long it takes to fill a bucket with a known volume, then multiply the flow rate by the estimated time spent conducting washdown activities per 24 hour period.
 - If any washwater is collected and reused for other washdown processes, be sure not to count this volume twice.
- For all systems, an estimate of the volume of any other inputs, either liquid or solid, that enter the manure storage facilities. Examples of such inputs are silage effluent, spoiled feed, and other washwater.

Combined with the livestock information, this information produces estimates of liquid and solid manure (and waste) volumes and weights to determine if there is an excess or deficiency compared to land application requirements.

GRAZING INFORMATION

This information is currently used for dairy farms only. Since grazing animals do not contribute manure to the manure storage system while on pasture, the estimated number of days the dairy cattle graze is used to deduct the daily volume of manure generated by these livestock during the grazing period.