

Drainage FACTSHEET



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BENEFITS OF DRAINAGE

A properly designed and constructed drainage system removes excess water from the land lowering the water table. It permits aeration of the root zone and warming of the soil when temperatures rise in the spring. One of the main reasons for this excess water is when precipitation is far in excess of crop requirements.

Figure 1 shows precipitation far exceeds evaporation in the winter months. On the margins of the growing season (March and October) the potential for saturated soil is high. Rain accumulates in the soil building up the water table. While it is not possible to alter the climate, it is possible to conduct the excess water away.

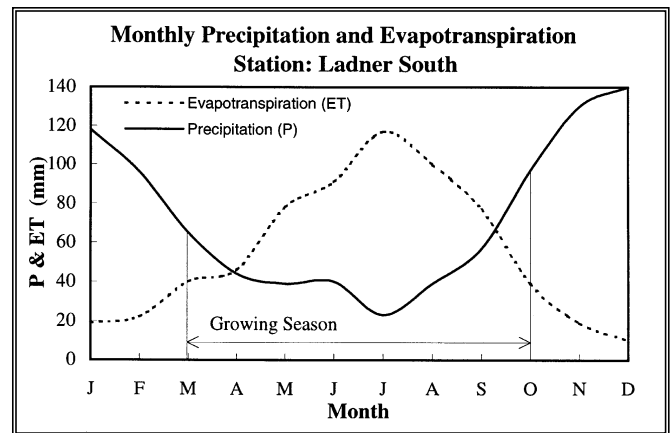


Figure 1 Annual Precipitation vs Evapotranspiration at Ladner, BC

CROP GROWTH REQUIRES DRAINAGE

There are four basic requirements for plant growth. In areas of the Province with excess rainfall or spring runoff, good soil drainage is required to ensure the right amounts of each of these:

1. Food

Plants require the right nutrients in sufficient amounts to grow. Manure and inorganic fertilizers are normally used to supply this need. Nutrients are better utilized by plants in well-drained soils.

2. Air

Air is required in the soil for seed germination, growing roots and for the growth of micro-organisms and worms that result in good soil structure. Air is not available in poorly drained soils.

3. Water

Plants require the right amount of water for growth. Too much will limit root and plant development, as well as, result in poor trafficability for fieldwork. Too little water will likewise limit crop growth.

4. Warmth

Plants need heat to germinate and to develop to full potential. Well-drained soils warm up more quickly, resulting in earlier, more productive growth.

In areas with excess rainfall or spring runoff problems, a well-planned drainage system will help to meet these requirements. Benefits to expect include the following:

INCREASED CROP YIELD

It is a fact that plants use fertilizers more efficiently in well-drained soils. In addition, drainage allows the root system to develop properly. The plants are able to draw moisture from a larger volume of soil and are therefore better equipped to withstand drought. Well-drained and aerated soils are less prone to plant diseases.

LONGER GROWING SEASON

A drainage system allows you to get on to your fields sooner in the spring. Tillage and seeding operations can start earlier. As well, the basic crop requirements discussed earlier are available sooner, giving the plant a better chance to reach its potential during the growing season. Weed control is easier since the crop is planted earlier in the spring.

LONGER HARVEST SEASON

A drainage system allows you to get on to your fields for longer periods in the fall. This gives a better chance to harvest late crops. Trafficability is increased and there is more opportunity for fall fieldwork.

GREATER CROPPING CHOICE & FLEXIBILITY

Well-drained soils offer greater choice and flexibility of crops. Land previously suitable to only moisture resistant crops may now be suitable for other higher value crops.

POTENTIAL FOR SUB-IRRIGATION

In relatively flat lands, water control structures to augment the drainage system can be used to raise the water table for sub-irrigation. Water can be backed up to the ditches and subsurface drains and be carried into the root zone by capillary action. Water control structures are essential to limit decomposition in organic soils.

CONTROL OF EROSION BY WATER

When rain falls on poorly drained waterlogged soils, it runs off overland and may carry soil particles with it. Well-drained soils have a capacity to absorb rainfall and runoff resulting in some control of erosion by water.

LESS SOIL DAMAGE

Soil structure describes how soil particles are arranged. Good soil structure occurs in well-drained soils. A drainage system should, with time, improve soil structure. Soil structure can be easily destroyed by compaction and smearing from farm machinery. Surface crusting from ponded water results from and compounds poor soil structural conditions. Soil structure damage is less likely to occur in well-drained soils.

MORE EFFICIENT FIELD WORK

Well-drained soils require less power to till. There is less wheel slippage and less chance of getting farm equipment bogged-down or stuck. Subsurface drains reduce the need for open ditches that interrupt field work and are regularly in need of maintenance.

INCREASED LAND VALUE

In addition to the value of the increased productivity, drainage systems increase the value of the land through increased capability.

PLAN FOR BEST RESULTS

A drainage system should be well planned and properly installed. The permeability of the soil should be assessed. Ditches and subsurface drains should be located and spaced properly. Because minor elevation changes are involved, a topographic survey is often required. Installation equipment is available today to place ditches and sub-drains with a high level of accuracy to ensure proper performance.

Case Study : Drainage Benefits to Forage

Harvesting forage depends on two factors:

1. crop development
2. soil conditions

If the crop does not develop as quickly as rising temperatures permit, harvesting is delayed unnecessarily, furthermore, if the soil is wet and soft or even flooded, harvesting is also delayed unnecessarily.

The ability to harvest forage, be it through grazing or cutting early in the year is of greatest significance in the economic operation of any forage producing enterprise. An early cut could mean one or two extra cuts, which could be equal to going from 10 to 13 tonnes per hectare per year. If hay is bought and stored over the winter, an early harvest would mean a reduction in the amount of hay purchased and the cost of storing it. Another benefit is the high quality of an early forage harvest and the dairy producer usually finds an increase in milk production.

Compared to the benefits, the cost of drainage is small. If it eliminates the purchase of as little as 1 tonne of alfalfa hat per ha, it has more than paid for itself. It is possible for increased production to pay for the entire drainage system as little as three years.

Advice and technical assistance is available through the local office of the [BC Ministry of Agriculture, Food and Fisheries](#). Ministry specialists from the [Resource Management Branch](#), local drainage contractors and consultants are available to assist with individual drainage problems and planning drainage systems.

The [BCMAFF Factsheet No. 545.400-1 Economics of Subsurface Drainage](#) provides information on a cost benefit analysis of installing a drainage system.

For further information on related topics, please visit our website

Resource Management Branch

www.agf.gov.bc.ca/resmgmt

Linking to our

[Publications and Conceptual Plans](#)

FOR FURTHER INFORMATION CONTACT

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