

Environmental Effects of Field Stockpiled Turkey Manure

This project began as a demonstration project initially in response to producer complaints with regard to the new "Code of Agricultural Practice for Waste Management" which requires covered storage for solid field stored manure from October to April in the Fraser Valley. Poultry producers, who realize the financial and workload implications of these regulations were reluctant to accept that manure stockpiles are a source of pollution to the environment. This project was thus developed to evaluate and demonstrate the effects from field stockpiling of poultry manure during the fall and winter period.

One of the issues raised within the poultry industry is the relevance and extrapolation of data from a smaller manure pile (40 yd³) to the pollution that could occur with a larger stockpile. Further to this issue is the opinion from poultry producers that larger manure piles typically have substantial volumes of 'dry' manure in the middle of the pile. It has been suggested that this dry area should minimize any pollution that could be caused from rainfall entering the pile.

Initially, to evaluate soil conditions under a large stockpiling site where about 2500 yd³ of manure has been piled annually for about 7 - 8 years, soil nitrate and ammonium samples were taken to a depth of 4 meters (13 feet). The manure at this site was deep stacked to a depth of about 12 feet with frequent packing of the pile as each truckload was added.

Results Showed Levels Higher Than Anticipated

Leachate volumes found ranged from 54 litres to a maximum of over 600 litres. During this period, rainfall amounts ranged from 1.7 cm. to a maximum of 9.2 cm. per sampling event. Concentration of samples of certain leachates with discharge limits allowed by B.C. Ministry of Environment, Lands, and Parks are identified as follows:

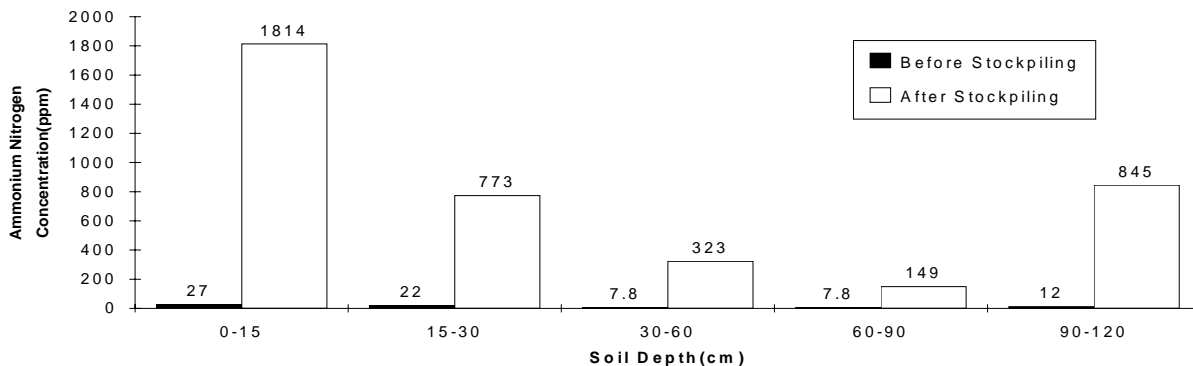
This table indicates that leachates from this manure pile were found well above the discharge limits set by the B.C. Ministry of Environment, Lands, and Parks. There was also a direct relationship between rainfall and leachate volume collected during the monitoring period. Therefore, as rainfall increased, so did the volume of

Type of Pollutant	Minimum Found	Maximum Found	Limit
----- mg/l -----			
Ammonium Nitrogen	32	1480	15
Nitrate Nitrogen	2	54	10
Phosphorus	0.5	89	10
BOD	161	670	45

leachate collected. As the monitoring period progressed, leachate concentration increased substantially over that collected initially. This manure pile became saturated after about 3-4 weeks, thus there were no dry spots in the middle of the pile.

A second aspect of this project was the monitoring of soil ammonium and nitrate levels found beneath a turkey manure field stockpile (see below).

Ammonium Nitrogen Concentrations found at Different Soil Depths Before and After Placement of the Turkey Manure Stockpile



To date, soil measurements have been taken before placement and after removal of the stockpile, as well as in July. It is interesting to note that for this very permeable soil, physical evidence (characteristic leachate color and smell) of leachate movement to about 3 feet was apparent under certain portions of the stockpile.

Influence of Poultry Manure Application Rate on the Potential for Nitrate Leaching with the Raspberry Crop

This is a cooperative project with the raspberry industry, and is partially funded by the B.C. Raspberry Growers' Assn. The purpose of this research project is to determine the optimum application rate of poultry manure on the raspberry crop that will maintain crop yields while reducing fall nitrate leaching. A second objective is to assess the use of fall cover crops as a means to assimilate excess fall soil nitrate, thereby decreasing nitrate leaching to the groundwater.

As any poultry producer located over the Abbotsford aquifer can attest, a great deal of concern is being focused on nitrate pollution of groundwater from manure application and crop production. Very little research worldwide exists relating to the goals of this project, so the results should prove very important towards reducing potential pollution from manure over-application as fertilization for raspberry production over the Abbotsford aquifer.

Promoting Poultry Manure Use for Vegetable Farms in the South Delta Area

The South Delta area is an area of intensive vegetable production (about 9,000 acres) where little manure is presently available to maintain soil quality and crop production. Soil organic matter is being seriously depleted in these productive soils. Such a depletion leads to reduced crop yield and quality along with soil productivity. Broiler and Turkey manure with their corresponding high organic matter contents along with high nutrient values would make an ideal soil amendment and crop fertilizer for this area. However, there are many obstacles to overcome before poultry manure can be applied yearly to large acreages of vegetables. Perhaps the most important of these are:

- 1) vegetable producers inability to pay all costs associated with hauling of manure due to volatile and unpredictable farm gate value for their crop
- 2) reluctance to reduce chemical fertilizer application rates in accordance with amount of manure applied -

crop producers unsure of how reduced chemical fertilizer, in conjunction with the use of poultry manure will affect their crop yields.

3) crop producers recognize the inherent soil amendment value in poultry manure, but are reluctant to commit funds to long-term soil conservation measures when their short-term financial requirements places them in a 'squeeze' situation.

The Sustainable Poultry Farming Group recognizes these problems but at the same time sees a need for a long-term solution whereby manure can be delivered in large quantities from surplus to deficient areas. Thus, this project has been developed to create awareness of poultry manure (broiler or turkey litter) as an economically viable soil amendment and fertility source for the South Delta Region in the Fraser Valley. A successful outcome will result in a permanent demand and use of manure in this area.

In the short-term it is envisaged that during the fall/winter periods, manure could be shipped to this area for a small transport fee to Delta producers. The advantage to poultry producers would be that they would not need to invest in such large storage facilities and in some instances, perhaps none at all. As well, manure would not need to be taken from storage and double handled in the spring. A further advantage to transport of manure to Delta would be the reduction in fall and winter manure supply near a contributing poultry farm and the corresponding increase in value that would occur in spring and summer manure markets through lower manure availability.

Right now, objectives for this project include working together with barn cleanout companies to establish contacts with Delta producers interested in obtaining manure. In addition, attempts are being made to develop the infrastructure for large-scale hauling of poultry manure to reduce transport costs. This concept seems an imperative for this, or any other innovative idea involving large amounts of manure to succeed.

Study Reveals Producer Costs Involved in Storage and Double-handling of Broiler Manure

A study done by Brad Stennes Consulting has revealed actual costs that will be encountered by poultry producers when a manure storage is built that meets the new Code of Agricultural Practice for Waste Management.

The study was done on a hypothetical 32,000 bird/cycle broiler farm allowing for manure storage for 3

Raspberry Field Nitrate Survey

Report Summary

cycles of birds/year ie.6 months storage. The type of building used to calculate the cost of construction was a open pole type structure with a concrete floor and 8 foot concrete retaining walls(construction cost \$18,100.00).

Annual costs associated with the building include repair and maintenance, subsidized interest rate @5%, and straight-line depreciation value over 20 years with no salvage value. These costs are as follows:

Annual Litter Handling Costs on an Average Size Fraser Valley Broiler Farm

Cost Category	Cost per Stored Tonne	Cost per 1,000 birds
Barn Cleaning	10.65	12.78
Loading to Storage	8.10	9.72
Annual Building Costs	13.35	16.02
Unloading from Storage	8.10	9.72
Total Cost	40.20	48.24

Land Remediation of Depleted Soils in 'Ball and Burlap' Nursery Operations

Substantial acreages of degraded soils are present in the Uplands area of the Fraser Valley. This project has been set up in conjunction with the Hog Producers' Sustainable Farming Group and the Matsqui/Uplands Soil Conservation Group. Nursery growers have shown interest in possible soil remediation strategies for their degraded soils.

Typical Soil Taken Harvesting Large 'B&B' Trees

Our group is working with mortality compost and turkey manure to demonstrate and carry out field scale trials showing the fertility and soil amendment value from these two products and their application to degraded soil. In addition, and just as important is the second aspect to this project. Two successive cover crops will be grown on the research plots. These crops will use the nutrients from the mortality compost and turkey manure to produce substantial biomass over the spring through fall periods. When worked into the soil this plant material will provide better conditions for future nursery stock growth while increasing soil nutrient supply and soil quality.

A raspberry field nitrate survey in the Abbotsford/ Matsqui area was undertaken to better understand the potential for nitrogen over-fertilization of the raspberry crop. The two dominant forms of field fertility management(poultry manure and chemical fertilizer or chemical fertilizer only) for the raspberry crop were studied and analyzed. Average chemical fertilizer nitrogen additions by raspberry producers were 51 kg N/ha when using poultry manure and chemical fertilizer, and 71 kg N/ha when using chemical fertilizer only. These values appeared high when compared to the B.C.M.A.F.F. recommended rates of 55 kg N/ha for the use of chemical fertilizer as the nitrogen source.

Fourteen fields with a history of poultry manure and chemical fertilizer application were sampled for nitrates during October 1991 . Seven fields were sampled with chemical fertilizer application only for the 1991 crop year. Two of these fields(one with poultry manure and chemical fertilizer and one with chemical fertilizer application only) were monitored in detail during August, October, and December for levels of, and changes in, soil nitrate.

For the two fields monitored in detail, nitrate leaching was evident from the 0-60 cm soil profile. Nitrate levels found in the two monitored fields compared well with levels found in the field survey.

We propose that a level of 85 kg/ha residual soil nitrate present in the 0-90 cm soil profile in October is 'acceptable'. At the time, fields fertilized exclusively with chemical fertilizer exceeded this value by about 80%, while fields fertilized with poultry manure and chemical fertilizer, exceeded this value by over 300%.

We recommend that raspberry producers who use poultry manure to fertilize their crop follow the results from research trials underway which will study the effective use of poultry manure as a primary fertility source.

Over the next two years, these trials undertaken by the Sustainable Poultry Farming Group, with cooperative funding from the B.C. Raspberry Growers' Assn. will study raspberry crop uptake of nitrogen from poultry manure at two different application rates. In addition, the use of a cover crop will be studied to reduce nitrate leaching in the fall and winter. Project cooperators for this research are Mr. Gurmail Sidhu, Huntingdon Rd. site and Mr. Gurmit Brar, Columbia Rd. site.

Poultry Manure Compost in a Potting Soil

Alternate uses for poultry manure are important from a standpoint of reducing possible surpluses in manure that would be land applied in the Fraser Valley and also for creating an increased demand for 'value added' poultry manure products. A recent marketing study for the swine industry has indicated that a market exists for composted pig manure. Further, the most economical use for this compost is to use it as a base for a complete artificial soil and sell it to the nursery industry. A similar need can be available for properly composted poultry manure.

The standard used now for a potting soil mix is peat and bark, with variations in proportions based on the grower. A possible soil using poultry manure compost could replace the peat component with compost while maintaining the bark as a stabilizing ingredient for the physical structure of the mix. Peat is a non-renewable resource that recently is showing signs of serious depletion within B.C.

Ideal Compost Composition for Potting Soil Unknown

The ideal composition of a compost-containing artificial soil is not known. This will be determined through greenhouse trials in which 3 levels of compost (10, 25, and 40% by volume), 3 types of nursery seedlings typically grown as container stock, and 3 fertilizer rates (25, 50 and 100% of label rates) are being set out in replicated blocks.

The objective for this project is to determine through replicated trials the optimum proportion of composted poultry manure in an potting soil mix.

In the Spring of 1993, it is hoped that a demonstration trial can be set-up at a nursery/greenhouse operation to show the effectiveness of this optimum potting soil blend. In the end, a less expensive and more environment friendly form of potting soil will result from this trial.

REPORTS/INFORMATION ON VARIOUS ASPECTS OF POULTRY WASTE MANAGEMENT AVAILABLE

1) Mortality Composting Video

- a brief, but well done video on the practical aspects of starting and operating an on-farm mortality composter. Running time approx. 10 min

2) Economics of Off-Farm Litter Disposal Options for South Coastal B.C. Poultry Farms

- a 28 page report prepared by Stennes Consulting with these 3 objectives in mind:

a) To identify alternative waste handling options acceptable under the "Code of Practice for Waste Management".

b) To collect or estimate costs associated with the handling and transport of litter under options identified in the report.

c) To estimate any additional costs or benefits in addition to the handling and transport costs associated with litter disposal alternatives.

3) Economic Feasibility of Poultry Manure Treatment Systems

- study was initiated to review and evaluate the economic feasibility of various treatment alternatives through examination of moisture control alternatives, on-farm manure treatment alternatives for average size B.C. farms, and feasible capital investment on the basis of operational and investment assumptions for these treatment systems.

