SUSTAINABLE STRATEGIES ADDRESSING THE SPECIALIZATION AND INTENSIFICATION OF ORGANIC AGRICULTURE

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Historically, livestock production and long rotations have been integral components in the development of organic farming systems. However, a recent trend in many areas of Canada is a move toward a specialization and intensification of farming practices paralleling those found in conventional agriculture. Fast growing markets of organic cereals and high-profit crops such as potatoes and vegetables has created a situation where these crops are grown in short rotations (i.e., three to four years), without the benefit of long-term soil improving crops (e.g., forage legumes and grasses) or on-farm inputs of composted manure. These "new" organic arable farming systems will undoubtedly be faced with agronomic problems such as nutrient recycling and weed management that will be distinct from traditional organic systems. Research strategies, concepts, and tools need to be designed and implemented to enhance conversion of these "new" organic systems to ensure economic viability and environmental sustainability.

The Organic Agriculture Centre of Canada (OACC) has recently initiated a multi-location trial to examine strategies for farmers to convert from conventional to organic arable production within a stockless farming system and comparing that to the sustainability of an organic system using either ruminant (i.e., beef, dairy, or sheep) or monogastric (i.e., swine or poultry) livestock. Moreover, the study is addressing the potential benefits of perennial forages in terms of nitrogen management, weed control, soil building, water source availability, and economic viability within an intensive (short rotation) cropping system. Along with comparing stockless, ruminant, and monogastric farming systems, forages will be introduced within the rotations at varying levels ranging from 25 to 75% of the rotation. Within each rotation a further variable is addressing forage management options and include; 1) mechanically harvesting the forage; 2) harvesting the forage and placing the cut forage in between rows of row crops and cereals; and 3) plowing down the forage as a green manure prior to seeding the crop.

The comprehensive study is founded upon several interesting research findings from previous work conducted at the University of Manitoba (UM) and the Nova Scotia Agricultural College (NSAC). Cropping systems researcher, Martin Entz and his graduate students at UM have clearly demonstrated that perennial forages in short rotations significantly suppress the spread of annual and perennial weeds. In the same system, they demonstrated that the inclusion of lucerne two years in four (in a wheat-lucerne-lucerne-flax system) eliminated the need for supplemental N for the first 8 years of the experiment. The researchers noted that the above system did result in soil-mining of phosphorus, and these results were later validated by an evaluation of several organic farms in western Canada. Entz revealed organic soil phosphorus levels were critically low on many long-term organic fields that had not received livestock manure.

Research conducted at the NSAC by forage agronomist, Ralph Martin, and his graduate students highlighted the potential of mulches in weed suppression and water resource availability. Soil moisture levels were consistently higher under mulch treatments versus

conventional tillage and showed no yield differences for both potatoes and maize. Harvested forages placed in between rows of row crops would not only demonstrate the mulch benefit of preventing evaporation from the soil surface, but also do not lose water via evapotranspiration as a living mulch would, an important quality in drought-prone areas.

Marrying their respective findings (benefits of forages in short rotations plus benefits of mulches), Drs. Entz and Martin, along with several collaborators across Canada came up with the idea to assess forages as mulches in row and cereal crops. The current research should determine if livestock contribute to a more effective transition strategy than farms without access to livestock and if a stockless system, how might forages be incorporated to ensure sustainability.

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