

**Workshop Title:** Permanent Raised Beds

**Speaker(s) & their title(s):** Denis La France, *CETAB+ - Centre d'expertise et de transfert en agriculture biologique et de proximité*

### **Executive Summary**

Denis La France shares his experience with permanent raised beds in both France and Quebec. He outlines the equipment needed for this sort of system. He presents findings from several different projects comparing permanent raised beds to conventional systems. He encourages farmers to do their best to incorporate the principles of permanent raised beds even if they don't fully adopt the system.

### **Detailed Notes**

French Project: GAEC Jardins du Temple

- First Denis introduces a six-year long French project using a permanent raised bed system.
- In this location they can spend 5 more months per year in the field than here.
- They spend more time trying to intensify production.
- The 3 main implements used are: deep cultivator-hiller, spring-tine cultivator/hiller and a simple tractor tiller, which is not available in Canada
- Sometimes this farmer will use a rototiller when he really needs to.
- He grows very high quality produce.
- History of farm: 1970s Kenning developed system for minimal tillage for vegetables.

Controlled Traffic Farming

- Cropping system is organized so the tractor tires always drive in the same areas - need square/rectangular field to use this cropping system.
- Better drainage, wheel tracks support tractor better - only work them very superficially, the water still goes into the tractor paths because it is undisturbed.
- This leads to better soil structure, better yields and less weed pressure.
- All the tools are used to bring soil onto the raised bed or keep it on the raised bed
- A Disk harrow has been modified by adding disks to clean up paths.
- He also added one extra tine to work centre area where there was originally a gap.
- He states that the deep tiller is very expensive and not recommended.
- The key to system is the sweeps, which go very deep (20cms) and just lift soil instead of beating it down.
- The flex tine cultivator prepares a bed for seeding.
- Denis likes soil with good capillary action (water movement) and good soil contact for starting seeds/transplants.
- He states that extremely loose soil is a myth and just leads to drier soil conditions.
- He makes many changes to equipment such using as a lighter roller and a heavier tractor.
- He has also adapted a green manure seeder so it seeds from one bed to another (from 10 to 6 feet).
- There are still some annual weeds in this system.
- He does not use a rototiller at all.
- He tries to only chop green manures if he is stuck; otherwise he tries to just incorporate manures.

Trial on clover-orchard grass green manure

- In the trial he used the disk hiller on poor soil, then used the tiller with bed raising implement, then disk tilled (3 separate beds).
- He also had a check plot where he used a rotary tiller, which puts all rocks and green manure 10 cms into the soil, this is very hard on soil structure but very practical.

#### Soil Profile Evaluation

- There was a significant difference in soil structure: permanent raised beds had very good soil structure and rotary tilled soil had very poor structure.
- The soil reacts immediately to a difference in treatment.
- His research was validated by an IRDA research project.
- One plot is clay loam and the other is heavy clay.
- They received two different treatments over 5 years: conventional: disk harrow, flex tine, cultivator vs permanent beds: chisel bed tiller, disk tiller.

#### Tillage Sequence Slide

- They reversed order of tillage because it was not working in the original order.
- Soil profile: after one year and difference is already remarkable: large clumps in conventional plot not far under surface.
- However the permanent bed soil is a biological influenced soil structure.
- He emphasizes the importance of being able to see the differences in soil structure by looking at it
- They are biological vs mechanically influenced soil structures.
- tilled soil and hard pan is really a problem.
- There was no significant difference in yield between the two systems in the first two years but in the third year the soil compacted too much, the tilled soil started better but as crop grew the onions almost caught up.
- In the fourth and fifth year the yield was better on permanent beds.
- There was no significant difference on weed pressure.
- The heavy clay has 3 times amount of deeper worm, 40 times more of the endogenic (shallow worm).
- Dry Summer: permanent raised beds: the soil doesn't get any denser as the season goes on. Conventional: the soil gets denser as the season goes on.
- Wet Summer: not the same as dry summer: with permanent beds: soil gets slightly denser as season continues conventional: similar to Dry Summer.

#### Economic Analysis

- If you make your own equipment your tillage costs are much lower but it is still an expensive system.

#### Conclusions

- The deeper your root system, the better your crops will grow.
- The farm in France has designed a new cheaper deep tiller.
- There are workshops held in Quebec about building your own equipment and a working group on DIY farm implements.

#### Questions

What's the minimum horsepower for this system?

- 60 HP tractor but weight of tractor but depends type of soil.

- Can you combine the permanent bed system with the tilling system? The systems are not a religion, there is flexibility, plowing is not a sin, you need to be practical when farming.

How do you work the sides of the beds?

He has sweeps that work the tops and sides of beds

- What do you think of the no till system that was presented this morning by Jeff Moyer as you say that tilling is key to permanent raised bed system? No till began in Brazil and then moved to Pennsylvania, which are both very different climates from Canada. Jeff Moyer tills every time he sows cover crop so it is not quite a no till system. Pure no till would be very difficult in Canada. No till is possible but we will have to adapt the systems to this climate.

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