MULTI FARMING SYSTEMS

Multi Farming Systems - How It All Began

In the beginning….

In 1951, when Australian farmer David Trevilyan was just 15, he hooked two tractors together in tandem in order to gain enough power to pull two implements on a spreader bar. At 21 he built his own 52ft spreader bar with a folding wing to run up the side of contour banks. These were the beginnings of a lifetime of innovations to farm smarter, faster and more cost effectively.

David drew his farm's acreage in a government ballot in 1957, and has proven to be a highly innovative no-till farmer and engineer in a country where every good idea must prove its ROI since there are no government farm subsidies. The operator of "Honey B Ranch" near Banana, Queensland, initially farmed with conventional tillage, but gradually moved to a no-till operation to stay in business.

Over the years the farm has grown barley, wheat, sorghum, skip row cotton (two rows skipped for every two planted), and more recently, green panic pasture grass and butterfly pea.

What drove the man……..

In the 1960's David built a land plane in order to level melon holes (natural depressions in the ground) on his new block. Even with two John Deere 5020's in tandem, he didn't have enough horse power to pull it effectively. This was enough motivation to start building a 4-wheel-drive tractor in 1971.

In 1975 the tractor was completed, and with 1,870 foot pound torque it became the world's largest. The tractor worked trouble free and was upgraded in 2002. Improvements included fitting a John Deere 8630 air conditioned cab, which was modified to swing around 90˚.

▲ Homemade tractor with Cat D9 engine and 90˚ swing around cab.

The majority of the farm equipment on the market at that time did not stand up to the harsh Australian conditions. The ground was too hard, the tips wouldn't penetrate effectively, and the constant crashing over stumps, rocks and large contour banks shook the machines apart. The useful life of a machine was around 5 years, and like every farmer, David wanted his machines to last a lifetime.

In response to this, the first major implement that David designed in his farm workshop was a 49 foot hydraulic chisel plough for conventional farming. It was pulled by the homemade D9 tractor and its features included:

- 39" underframe trash clearance,
- 1200x20 castor wheels placed fore and aft of the frame for manoeuvrability and maximum trash flow,
- a hydraulic ram on each tine to force the digging tip to penetrate the tough soil, and

•a strong and robust frame, with minimal maintenance and few wearing points.
David called it the Multiworker because of its versatility, and it proved to be an extremely successful machine.

▲ Multiworker Chisel Plough for conventional farming in tough conditions.

Pretty soon the tremendous weight of the D9 tractor caused compaction problems, so controlled traffic farming soon became a necessity. The farm was divided into straight tramlines with a headland around the perimeter. Farming operations could be started in the middle of the paddock or from the edge, it made no difference. This was before GPS, so tramlines were marked with numbered chemical containers tied to the fence, but weren't difficult to see on an open paddock.

The skip row cotton was being aerial sprayed with huge wastage, so a 108ft tow behind sprayer was built. The introduction of precise chemical application cut the chemical bill by four times.

▲ 108ft sprayer for controlled traffic.

When the precision depth Multiplanter was designed, it was also built to 108ft to match the sprayer. This allowed the tramlines to be extremely wide and resulted in less compaction overall. David extended the cotton picker so that its wheel tracks and picking width also matched the tramlines as much as possible.

The Multiplanter frame was extremely robust which was perfect for employing gantry farming. This involved using the frame to hang various attachments from to perform a variety of operations.

When shield spraying cotton it was vital that the implement tracked true and covered exactly the same ground, otherwise the crop would be killed. Most of the farm was undulating, and there were many contour banks, and with such a wide machine and such a long pull, the Multiplanter slid or "crabbed" (from gravity creep) down the hills if not controlled.

David solved the problem by using phasing rams on the rear castor wheels for steering. He would sit forward driving the tractor, while one of his kids would face backwards steering the Multiplanter using an electronic switch. This was all prior to the introduction of GPS.

Water was (and continues to be) a constant issue for the viability of the farm. With an annual rainfall of 27", the amount wasn't the problem, it was how often and how hard it fell. Summer rains came down in buckets and did little except wash away the valuable topsoil, and very little soaked in.

In an attempt to retain some of the water, large chains were attached to the back of the planter frame between the skip rows with bent steel plates welded to the side of every second

link. As the chain rolled over it created a depression in the ground where the water could collect and soak in (paddle dykes).
This worked relatively well, but meant it was extremely rough for the cotton picker to run over when it wasn't on a tramline. Erosion was still a problem because the water overflowed when the holes were full. With the move to no-till and full residue cover in extremely hard, dry ground, the paddle dykes could no longer penetrate the ground.

Increasing fuel prices made finding a no-till solution a necessity rather than an option. The only way to keep the topsoil and have some chance of retaining sufficient water seemed to be to leave the stubble standing.

A No-till Planter is Born

In 1985 a group of farmers approached David to build a precision depth planting tine and seed tube. It was to be based on the Multiworker due to the success of the hydraulic tine that pivoted on a D4 track pin and bush.

These farmers wanted every seed to come up, at the same time, and for each seedling to grow into a vigorous and healthy plant. This would be achieved by precisely placing each seed exactly where they wanted it, and compacted in moist soil. They didn't want any maintenance, they just wanted to hook up the planter and go.

David could soon see that it was impossible to achieve these objectives without a parallelogram which would make a press wheel and digging tip move in unison. The challenge was in designing a parallelogram that would not wear.

The result was the Multiplanter tine assembly which did not wear when it was under tension from the hydraulic ram. A bolt recently taken out of the pivot point of a 19 year old machine that had sown 100,000 acres was hardly worn.

▲ Multiplanter tine assembly. Press wheel depth controlled seed tube and digging tip

By pure chance it turned out that the construction of the Multiplanter contained everything that was needed in a no-till planter.

- Precision seed placement,
- Preparation of a seed bed and tilth in one pass,
- Press wheel depth controlled seed tube and digging tip (resulting in huge fuel and power savings),
- Hydraulic pressure on the press wheel for optimal seed/soil contact,
- Hydraulic pressure on the digging tip for maximum penetration into hard soils, which could be altered in the tractor cab on the run,
- Minimal maintenance, with grease points and moving wear points virtually eliminated,
- Superb trash handling ability, and
- Strong and robust frame construction.

The Disc Debate. The debate has heated up in recent years because of the movement towards minimal soil disturbance. The fact remains that discs :

- Leave a smear in wet soil that is difficult for roots to penetrate. The plant is left stunted with a wedge

shaped root system, and can easily topple over,

- Do not provide a seedbed and tilth,
- Cannot create a water harvesting trench,
- Cannot penetrate extremely hard country,
- Can hairpin on crop residue and won't penetrate the ground, and most importantly
- Cost a fortune in both time and money to maintain.

▲ Multiplanter.

▲ Disc opener.

Planted on the same day, note the stunted root system with the disc opener.

At the end of the day….

The success of a farming operation is a holistic one. There are many important features that a no-till planter should have, and none should be looked at in isolation. Success is not determined by grain in the bin alone, or even net profit. Often farmers forget the opportunity cost associated with their time, and the stress involved in getting the job done.

What really matters in life? Isn't it spending time with your family and friends, and enjoying your quality of life? How much is having a trouble free operation worth?

A no-till planter should last forever, it shouldn't take up too much time and money to operate, and must have the versatility to do everything you need it to do. It is possible.

▲ A planter should be able to handle full trash cover and penetrate tough soil.

Further information can be found at www.multifarmingsystems.com.au.