

Soil Regeneration Unlimited

CURSE-BUSTER™

Shen Tu Kang

Free-Till Intermittent Vertical Tillage Machine Report for 2010

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Submitted by

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AND

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Permanent Vegetative Cover:

Location: MCD Ranch near HunChun City, Jilin, PRC 133300

Crop: Unimproved native grassland

Used for: Dry hay production and grazing for cattle, goats and sheep

History:

The field utilized for this trial is about .5 hectare in size. It has been fenced and grazed since 2003 under the supervision of Timothy R. Shell, farm manager. The first growth has been harvested for dry hay for several years. Following the first growth removal there has **never been** sufficient amount of re-growth for machine harvesting to make hay again. So the cattle were pastured on the field during the rest of the summer and fall seasons.

In 2010, a plan was laid to follow the first cutting hay removal with operation of the Free-Till (Curse-Buster) machine. Using a penetrometer to measure soil strength it was determined that sever compaction existed throughout the field area to depths of 15 cm or more. Some of the compaction had been the result of the movement of heavy construction equipment used to improve the stream banks along the field.



The native grasses and legumes in the field stopped vertical downward growth in many areas at 5cm in depth. It was very important during the tillage process not to dislodge these fragile root systems.

First harvest of the field in 2010 took place during the last week of June. The small square bales totaled 10 weighing about 20 to 25 kg. each.

Procedure:

After the crop was removed, old dairy cattle pack manure was then applied to the surface of the field. Then the Free-Till machine was run over the field in two different directions to provide maximum compaction relief while leaving root systems securely attached to the soil.



The Free-Till was adjusted so that the tillage tines did not lift the poorly rooted plants from the soil. The rotary harrow was used to gently tamp the surface and break clods of old dairy manure.

Since the dairy processes raw milk in to cheese, it has excess cheese whey available. This cheese whey and some sucrose added to it were applied to the foliage when the plants were about 15cm tall.

At 55 days following the first harvest the field was mowed again for a second crop of hay for winter feed for the dairy cattle. Rainfall during the period was normal for the area totaling approximately 150mm. (or 6 inches) Temperatures were normal to slightly above normal during August.

This regrowth was very out of the ordinary for the field. Korean



Lespedeza grown on a field for the same time period was only 15cm tall. Here the growth was knee-high.

Results:

The resulting harvest of hay totaled 150 small square bales. This is the largest single treatment increase ever recorded in forage and pastureland improvement during the work with this technology that spans nearly 30 years in North America.

It is the first ever work with native rangeland grasses and legumes in Asia with this tillage technology.



The field that had yielded 10 small square bales 55 days earlier, yielded 150 bales following the vertical tillage operation combined natural organic manure and a single cheese whey/sucrose foliar application.



Timothy R. Shell, Farm Manager since 2003 at MCD

Soybeans:

Location: Hope Farm, HunChun City, Jilin, PRC 133300

Crop: Hi-Oil Soybeans

Used for: Oil and Soybean Meal

History:

The one hectare field on sandy and gravelly loam soils has been rotated from corn to soybeans for many years on 70 cm ridges. There was no soil test information available and no fertilizer of any kind was applied. Management at the farm made the decision to convert the field to flat farming and to do no cultivation during the growing season, relying only on chemical weed control.

The planter was a five row unit that had never been used since it had been purchased. The crop sprayer was also a new installation and both required considerable field calibration. As a result the bean population was lower than it could have been in the first planted portion of the field. Weed control also suffered even with a required post-emergence application of chemicals to control escaping annual grasses and lambsquarters.

No supplemental liming materials or fertilizers of any kind were applied to the field.

Procedures:

The Free-Till machine was run two times over the field. At the end of the second pass the rototiller pan which had developed over the years was eliminated over about 30 percent of field area in a random pattern.

Beans were then planted at close to 223,000 seeds per hectare or 90,000 seeds per acre.



Root balls were easily knocked clear of the planter shoe by the fertilizer opener.

The small tractor which was used to apply herbicide resulted in serious enough compaction from the tractor rear wheels on the bean row that in several places beans failed to emerge. The two post-applied chemicals for weed control were effect at suppressing the weeds during a critical flowering and filling period but the pressure was so intense that the decision had to be made to hand harvest the crop. One application of an insecticide was necessary because of an aphid invasion.



Weed control left much to be desired. Machine harvest was impossible because of all the green weeds that were present.



Results:

Soybean plants remained very healthy through the growing season and maintained excellent color with excellent nodulation. No rhizobium inoculum was used to achieve the healthy nodulation.

During the hand harvest it was apparent that the plants had rooted very deeply because of the green stalks and excellent roots that were difficult to pull with two hands.

The following results are the courtesy of Ryan and Lori Eidson.

2010 在希望农场的大豆 【前面数字代表每项所需的资金】

1000 元	5 月 22 日 250 斤大豆被种于希望农场
410 元	除草剂
540 元	除秸秆剂
250 元	每台机器大约所需的燃料和用油量花销
87 元	针对牙虫的杀虫剂
100 元	双把手的喷水泵【应用于蚜虫】
200 元	维修费
1280 元	需 16 人帮助收割在十月七号
570 元	聘请脱粒工作者【他们将每 150 斤入袋需 15 元】
4437 元	合计花销
12402.4 元	产量：3875075 千克，每英亩 3516 千克，1.6 元每斤
77.6 元	出售回收后闲置的大豆种子
12480 元	收入
8043 元	大豆赢利
1204.04 美元	按一美元合人民币 6.68 元的汇率
281% 回报	
大约 2.5 英亩的田地【1ha】	
481.62 美元	每英亩赢利

2010 Soybeans at Hope Farm

RMB

1000	250 jin soybean seed, planted May 22
410	Pre-emerge herbicide
540	Post-emerge herbicide
250	approx. cost of fuels & oil for tractor
87	Insecticide for aphids
100	Two hand sprayer pumps (apply insecticide)
200	Sickles
1280	16 people help harvest on Oct 7
570	Rent thresher (they charged 15 yuan per 150 jin bag)

4437 Expenses

12402.4	Yield: 3875.75 kg, 56.8 bu/acre, 1.6 yuan/jin
77.6	Sold back unused seed beans

12480 Income

8043	Profit on Soybeans (RMB)
\$1,204.04	USD (at 6.68 exchange rate)
281%	return

About 2.5 acre field (1 ha)

\$481.62 USD profit/acre



Winter rye was seeded using the Free-Till machine to prepare the seed bed and incorporate the seeds following the soybean harvest. The cover crop will be early grazing for beef cattle.

Corn:

Location: HunChun City, Jilin, PRC 133300

Crop: Yellow Dent Corn

Used for: Corn Meal

History:

The field where the corn crop was raised using the Free-Till as the only tillage prior to planting has been in continuous corn production for many years. The stover was removed at harvest time in 2009 or had been burned prior to tillage in the spring of 2010.

The corn producer told us during the last month of the growing season that the corn adjacent to his that was planted following the use of the roto- tiller was experiencing root tipping problems. Even at harvest time the root systems were well anchored and showed no evidence of tipping out of the top of the ridge.



Corn root condition was excellent at harvest October 28, 2010

Procedures:

Two tillage passes were made with the Free-Till machine using the rotary harrow both times. The first pass required reducing vertical tillage tine angle offset be reduced to a minimum and an increase in the aggressiveness of the rotary harrow.

This was done to avoid bringing wet cold soil to the surface of the field.



A conventional shoe type corn planter was used to plant the field. And the corn was cultivated twice. The operator complained about the difficulty of cultivating other corn fields following rainfall events. He said it was never a problem where the Free-Till machine had tilled the soil before planting. "They were dry enough to cultivate before any other fields in the area."



The old roto-tiller pan was still evident when the plants were dug in mid-September. The clusters of roots which grew through the tillage pan because of the Free-Till tine action were obvious. Many of them broke during removal at over 25cm below the top of the pan area which was at 20 cm from the top of the ridge.

Results:

Ten row sections were hand harvested on October 28th, 2010. The percent of an acre harvested was 0.49 percent of an acre or 0.198 percent of a hectare. The total weight of the ears harvested corrected to 17% grain moisture content calculated to a yield of 17,154 kg/hectare or 219 bu./acre of shelled grain. The final population was 24,285 plants per acre or 59,964 plants per hectare.



The corn was harvested from ten random row segments to compute the yield using a grain moisture content of 17 percent. It was planted in 65cm row spacings. The largest ear weighed 0.57kg.



The pen in this picture is 14cm long. The ear size of the largest group of ears indicates that the yield could have been increased by planting more seed per hectare.

The ear assortment was typical of that seen in most similar plantings, yielding no evidence that the planter had experienced any unique soil conditions which adversely affected the resulting crop of corn.

Approximately 8% of the ears were stunted for assorted reasons. Most of the plants these ears came from showed signs of late emergence by having smaller than normal stalk diameter.

The large number of ears that weighed over 0.5 kg indicates that the combination of production variables could have supported more plants per hectare. The largest ear weighed 0.57 kg (or 1.25#). No hand thinning was performed. Adjusting the population upward would probably have improved the yield.