

# Future Forage Systems Project

## Plantain and Oversowing Hub Notes Castlepoint, 10<sup>th</sup> July 2013

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### *Future Forage Systems - Background*

The East Coast Future Forage Systems Project provides the opportunity to road-test a range of forage technologies such as lucerne, plantain and annual clovers – both as crops and on hill country. Where possible, this will consist of on-farm demonstrations where new options are benchmarked against existing farm practice. Once we understand how these alternatives perform locally, we can look at integrating them into farming systems.

The focus at Castlepoint Station is to improve the legume content of dry hill country by over-sowing a range of clovers

## *Site 1 - Valley – 10.0 ha*

### *Objective:*

- Evaluate success of over-sowing plantain and a range of annual clovers by aspect
- Seed set and hard seededness of annual clovers following different closing dates.
- Regeneration from seed bank (over several seasons).

### *Over-sowing seed mix:*

- 5 kg/ha Tonic Plantain
- 7 kg/ha 'Arrotas' Arrowleaf clover – deep tap root well suited to summer dry
- 3 kg/ha 'Sensation' Red clover – tap rooted
- 3.5 kg/ha 'Bolta' Balansa clover – deeper and more extensive root system than white clover
- 3.5 kg/ha 'Enrich' Persian clover – tolerant of waterlogging
- 2 kg/ha 'Nomad' White clover

**24 kg/ha Total**

### *Fertiliser*

- 250 kg/ha Cropzeal 16N (NPKS 15.4, 8.0, 10.0, 9.6) at over-sowing

### *Measurements*

- Seed and fertiliser distribution
- Seedlings at 9 weeks/plant numbers before first grazing
- Plant numbers at closing
- Number of seed heads, seed set and percentage of hard seeds

### *Timeline*

- **22 November 2012** - 1st spray and fallow – 3l/ha Roundup Transorb (glyphosate) + 40g/ha Granstar (tribenuron-methyl) in 100 l water /ha
- **26 March 2013** - Spot spray variegated thistles with 2 l Agritone (MCPA) in 100 litres water/ha
- **28 March 2013** - 2nd spray - 2.5 l/ha Roundup Transorb (glyphosate) + 100ml/100l Pulse + 40 g/ha Granstar (tribenuron-methyl) in 100 l water/ha
- **3 April 2013** - Fertiliser - 250 kg/ha Cropzeal 16 (NPKS 15.4, 8.0, 10.0, 9.6)
- **4 April 2013** – Seed over-sown by helicopter
- **10 April 2013** - Post over-sowing grazing and treading with 2100 hoggets chased around the paddock for four hours
- **9-11 June 2013** - Counts of clover seedlings along a transect. Exclusion cages placed on representative sites
- **28-30 June 2013** – 800 hoggets grazed

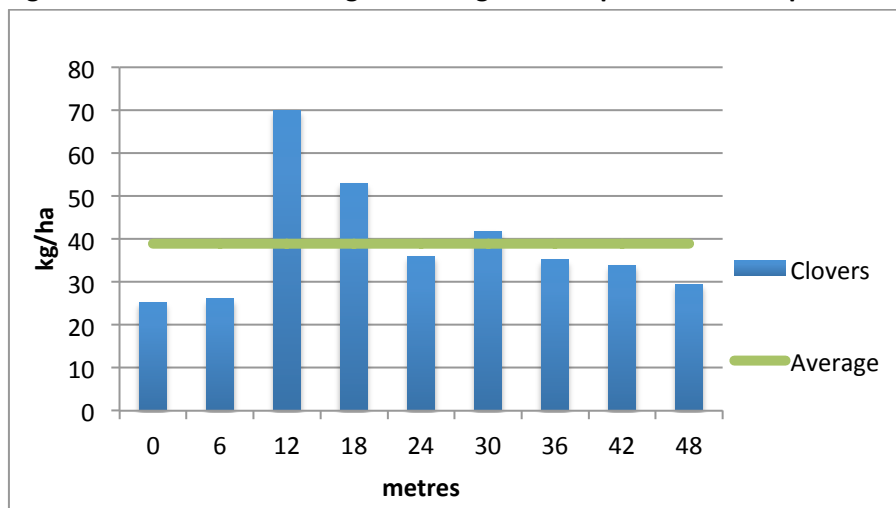
### *Results:*

**Seed and fertiliser distribution** – Collectors were placed at 6 metre intervals on a diagonal 48 metre line downhill across northern facing steeper country. Seed and fertiliser were sown on different days. There was a wide range in the sowing rates recorded in the collection buckets for clovers, plantain and fertiliser. Over a short transect the average rate of clover seed (38 kg/ha) twice the planned rate of 19 kg/ha (Figure 1). The average plantain over-sowing rate along the transect line was 8.4 kg/ha, nearly

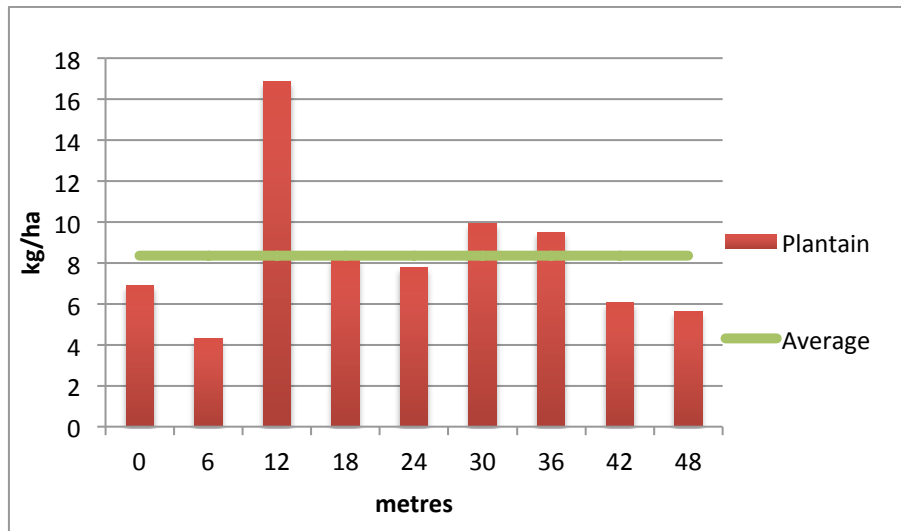
twice the planned rate of 5 kg/ha (Figure 2). There was a high correlation between clover seed and plantain seed in each collector, suggesting that the seeds were behaving similarly when being sown and that some areas were receiving more seed. Note – the individual seed weight for plantain is very similar to the average of the clovers over-sown.



**Figure 1 - Clover over-sowing rate along downslope transect 0=uphill end**



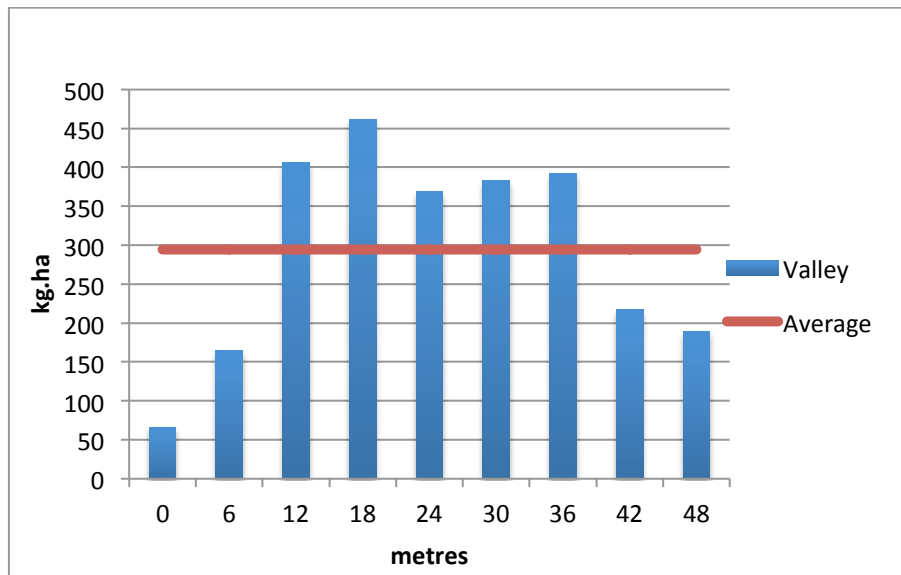
**Figure 2 - Plantain over-sowing rate along downslope transect 0=uphill end**



Fertiliser along the transect averaged 294 kg/ha vs the target rate of 250 kg/ha. However there was a large range in the amount received by individual collectors, range 66-392 kg/ha (Figure 3).

The reasons for the high seeding rate collected are not easily explained as we do not yet have the helicopter flight paths. However, looking at the paddock there appear to be areas where there are less clover and plantain plants. A decrease in seed sown at one location will mean higher seed rates elsewhere.

**Figure 3 - Fertiliser application rate along downslope transect 0=uphill**



**Seedling establishment** – Seedlings of clover and plantain were counted along 50 metre transects that covered a range of aspects (Table 1). Establishment of clovers and plantain was very good in all aspects other than southern slopes and the easy top slopes. There was very poor, almost nil, establishment of seedlings in the moist flats between the two hills - this area was not counted. The reason for the establishment failure could be due to distribution, residual effects of MCPA or insect

damage. Establishment rates in excess of 100 clover plants per square metre are very good and reflect the high seeding rate used. The high establishment of plantain from over-sowing is very encouraging.

**Table 1 - Seedling counts 9 weeks after over-sowing**

Transect	Slope	Seedlings per m <sup>2</sup>	
		Clover	Plantain
A	Dry north upper	114.2	77.8
B	Dry north lower	135.7	55.4
C	Moist flats	202.7	114.7
D	South slopes	50.2	46.5
E	Flat tops	53.1	27.5

#### *Grazing recommendations:*

- Graze Valley when plantain has 6 or 7 true leaves. True leaves must be fully or very near fully expanded.
- Grazing should be done to minimise pugging as plantain crowns are very susceptible to damage when ground is wet.
- The first grazing should remove no more than 2/3 of the existing herbage. Leave 6-8 cm behind. This will require a hot wire along the bottom of the block to fence off areas with well advanced plants. Other areas may require fencing off and grazing as they become ready for the first graze.

#### *Lessons/observations to date:*

- Fallow/double spray very successful - Good control of rats tail and rushes in particular
- Successful introduction of clovers and plantain into most aspects. Thatch preventing seedling establishment in some inter-track areas
- Seed/plant striping evident in some areas – less than ideal distribution of seed and fertiliser
- Large areas of moist country in middle flats with no seedlings – either not sown, spray damage or insect damage? But no bug damage evident in June. Thistle spray may have had an impact as excessive amounts of MCPA (Agritone) in the soil may temporarily inhibit seed germination/ plant growth.
- Poor seedling numbers on crest – desiccation of seedlings post over-sowing?
- Thistles require special attention. Thistle seedlings are providing large amount of competition on camp areas. May require knapsack spraying

### *Site 2 - Horse (16.6 ha) Oxen (11.2 ha) & Cob (10.9 ha)*

#### *Objectives:*

- Directly improve the legume content of dry hill country (i.e. over-sowing without spraying) and obtain stock performance data if possible.
- Compare the effects of a sward suppressant spray on clover establishment
- Compare the effects of different closing dates on the ability of aerially seeding annual clovers to set seed and re-establish.

### *Over-sowing seed mix:*

- 7 kg/ha 'Arrotas' Arrowleaf clover
  - 3.5 kg/ha 'Bolta' Balansa clover
  - 3.5 kg/ha 'Enrich' Persian clover
  - 1 kg/ha 'Prima' Gland clover
- 15 kg/ha total**

### *Closing dates for re-seeding:*

- Cob (right-hand side) – Control
- Horse – (middle) - Early close 1st November
- Oxen – (left hand side) - Later close 1st December
- Additional earlier closing dates within paddocks using cages.

### *Fertiliser:*

- Nil at sowing – planned for autumn (not yet applied)

### *Measurements:*

- Stock weights in and out. Numbers of stock and days grazed
- Seed and fertiliser distribution
- Seedlings at 9 weeks/plant numbers before first grazing
- Plant numbers at closing
- Number of seed heads, seed set and percentage of hard-seeds
- Animal performance

### *Timeline:*

- **Summer management** - Grazed as hard as possible over the summer with ewes and cows
- **26 March 2013** - Chemical top two swaths along fence line and where cover is thick prior to aerial sowing - 150 ml/ha Roundup Transorb X (glyphosate) in 100 litres water/ha to Oxen
- **4 April 2013** – Over-sown by helicopter.
- **9-12 April** - Treading with 2300 mixed age ewes for 2 days in each paddock
- **3-6 May** – 2300 mixed age ewes for 2 days in each paddock
- **7-10 June** – 2300 mixed age ewes for 2 days in each paddock
- **10 June 2013** - Total counts of clover seedlings down transect. Cages placed

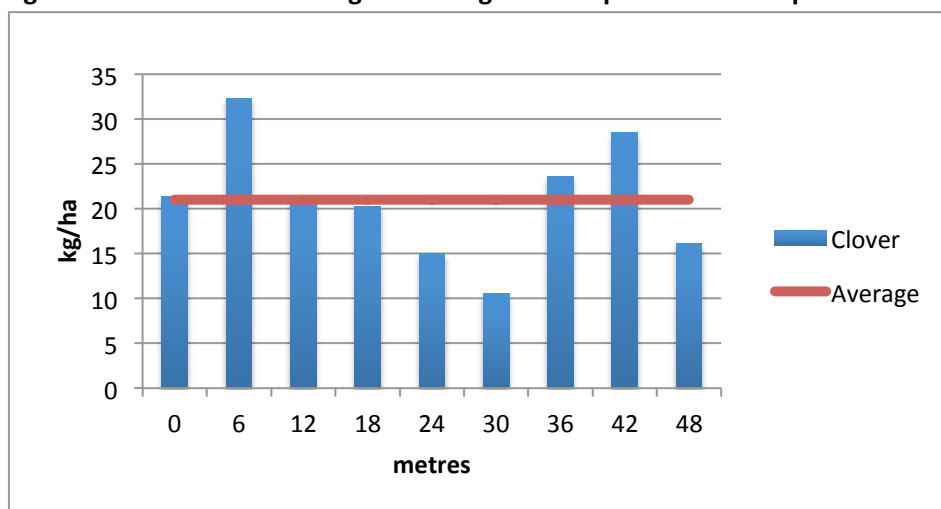
### *Grazing recommendations:*

- Post over-sowing - Graze twice as frequently in rotation. Allow to grow to only  $\frac{3}{4}$  normal pre-graze height and remove stock when twice the normal residual is left.

### *Results:*

**Seed distribution** – Collection buckets were placed at 6 metre intervals straight down the slope for 48 metres to measure seed distribution. Over a short transect the distribution was variable (10-32 kg/ha) with the average rate of clover seed being 21 kg/ha compared to the planned rate of 15 kg/ha.

**Figure 4 – Clover over-sowing rate along downslope transect 0=uphill**



**Seedling establishment** – Clover seedlings were counted along 50 metre transects that covered a range of aspects (Table 2). Establishment of clovers and plantain was low in all areas other than the sprayed steep northern aspect. While over-sown clovers are present throughout the over-sown areas their numbers are low - it appears that they have not established well because of competition from the existing sward. Further seedling counts will be undertaken although the low numbers present in June suggest that they are unlikely to make a significant contribution to production during the spring and summer as plant numbers are expected to continue to decline.

**Table 2 - Seedling counts 9 weeks after over-sowing**

	Spray Steep North	No Spray Moist North	Steep North
Seedlings per m <sup>2</sup>	130.8	36.8	26.3

**Lessons/observations to date:**

- Pre-grazing not severe enough? Poor establishment where existing sward provided competition – better establishment where sprayed. 100 ml/ha Roundup Transorb did not provide enough suppression in moist areas
- Inoculation failure with some seedlings – one species?
- Over-sown large leaved clovers standing out quite well.
- Some areas with good clover establishment but also very large areas with few plants.
- Seed striping.
- Dry open northern sprayed areas can have high numbers of clovers.
- Significant competition in grassed areas.

**Discussion points:**

- Role of annuals – will they naturally re-establish in a sward without help. Will sowing some un-scarified seed help with future sowings in subsequent years.
- Role of tap rooted plants e.g. Arrowleaf/lucerne – in un-cultivable hill country
- Can plantain be managed on un-cultivable hill country
- Risk of spraying/fallow of steep areas
- Future animal health benefits from increased legume diet