Student 4: High Achieved

NZQA Intended for teacher use only

1

Pro-Gibb – Gibberellic Acid.

Aim: To find out the optimum application rate of gibberellic acid for pasture growth.

Preparation and spraying on Pro-Gibb

Equipment: Lawn mower, an even section of perennial rye grass, At least 80 metres of string, 45 pegs or standards,

#1- with a lawn mower, mow an even section of perennial rye grass 14 meters by 2m. Collect the cut grass in the catcher; leave grass at 3cm above the soil. The mowing process represents grazing.

#2- we are trialing five concentrations, each concentration will be trialed in a metre squared plot four times, so for each concentration we will need 4 metres squared, Mark plots out using pegs and string, the measurement should be within the nearest cm. Have one metre gaps between each 4m squared plot so spray drift will be less likely to occur.

2

#3- with a 10mL pipette measure out 10mL of the 0.001 Grams per Litre concentration and mix it into a nap sack rose sprayer with 2L of water. Make shore the sprayer and mixing items are washed out thoroughly (3-4 times) with distilled water to avoid any contaminants. Spray the mixture on one square metre of the section ensuring that the spray is evenly applied; remember not to allow spray drift. Do this procedure four times for each concentration. Label each 4m-squared plot via the concentration of Pro-Gibb applied.

Final method - Mixing:

You will need four 5-litre drums, a funnel, 30 litres of distilled water, a funnel, conical flask, 5-grams of Pro-Gibb, 20 mL of Country mile organic silicon, safety glasses, Scales that can measure no less than two significant figures.

#1- you will need to measure out four stock solutions for each concentration because the size of the Pro-Gibb will be to hard to accurately weigh in smaller form.

#2- Fill a clean 5-litre conical flask up with distilled water, add Pro Gibb and 5mLs of Country mile organ silicon. Pour the mixture into a container and label by its concentration. Do this process for all four mixtures.

Mixture A- 5L water, 0.5g Pro Gibb, and 5mLs of Country mile organic silicone.

Mixture B- 5L water, 1.0g Pro Gibb, and 5mLs of Country mile organic silicone.

Mixture C- 5L water, 1.5g Pro Gibb, and 5mLs of Country mile organic silicone.

Mixture D- 5L water, 2.0g Pro Gibb, and 5mLs of Country mile organic silicone.

#3- we only want 40mLs of each solution, with a measuring cylinder measure out 40mLs of each mixture, pour into clean separate containers. Now the solutions are ready to be used.

Harvesting the grass to find out the percentage change in dry matter:

#1- Fifteen days after Pro-Gibb application collect 20 supermarket bags, cut each plot (metre square) with clippers right down to soil level. Put grass-avoiding contaminants such as dirt; from each plot into separate bags remember to label these bags of what the sample they contain.

#2- Weigh each bag of grass and record it as wet weight on the table below.

#3- put one bag of grass in a casserole dish, place in a microwave, and turn it on high until all the moisture has evaporated from the grass. Re-weigh the grass; this is how we find out the dry matter. Do this process for all 20 samples and record on the table that says Dry matter below. When calculating the average grams of dry matter per metre squared make shore to leave out any outliers, these will have an effect on the results.

#4- We found out that drying out the grass to find the dry matter using a microwave took to long, we found it easier to weigh all the wet weights and find the predicted dry matter content in the grass. This meant that we only had to find the dry weight three samples.

$$\text{Average \% dry matter} = \frac{\text{sample\#1 + sample\#2 + sample \#3 + sample \#4 (DM plot A)}}{4}$$

We took this as the average % dry matter making shore to leave out any outliers.

Once you find the average % dry matter divide it into every wet weight sample.

Wet weights (grams per meter^2)

Concentrations	Sample#1	Sample#2	Sample#3	Sample#4	Average
0.000	488	319	555	536	474.5
0.001 (a)	630	490	476	481	519.2
0.002 (b)	484	546	578	644	563
0.003 (c)	349	559	383	400	422.75
0.004 (d)	686	527	635	548	599

3

Dry weight (grams per meter^2)

Concentrations	Sample#1	Sample#2	Sample#3	Sample#4	Average
0.000	106	64	208	104	91.3
0.001 (a)	134	104.6	101.6	102.6	102.9
0.002 (b)	103.3	116.5	123.3	137.4	120.1
0.003 (c)	83	119.3	81.73	85.4	92.35
0.004 (d)	146.4	112.5	135.5	116.9	127.8

Dry weight (Kilograms per hectare)

Concentrations	Average KgDM per Ha
0.000	913
0.001 (a)	1029
0.002 (b)	1202
0.003 (c)	923
0.004 (d)	1278

Calculating kgDM per ha

Formula = $\frac{\text{average weight DM g/m}^2}{1{,}000 \times 10{,}000}$

0.000g = $\frac{91.3\text{g/m}^2 \times 10{,}000}{1{,}000}$ = 913 kg/ha

0.001g = $\frac{102.9\text{g/m}^2 \times 10{,}000}{1{,}000}$ = 1029 kg/ha

0.002g = $\frac{120.25\text{g/m}^2 \times 10{,}000}{1{,}000}$ = 1202 kg/ha

0.003g = $\frac{92.35\text{g/m}^2 \times 10{,}000}{1{,}000}$ = 923 kg/ha

0.004g = $\frac{127.8\text{g/m}^2 \times 10{,}000}{1{,}000}$ = 1278 kg/ha

Valid conclusions

Our results suggest that adding double the amount of required Pro-Gibb will increase dry matter production by 6.4%. Ideally if we double the solution the farmer would like a 100% increase in dry matter production but realistically is only getting a 6.4% increase. This is where our results back up the nationally required amount of Pro-Gibb concentration which is 0.002 grams per litre of water, making it twice as concentrated (0.004 grams) will mean that it will cost twice as much and the farmer will only get a 6.4% increase in production.

4

Our results also suggest that adding the Pro Gibb at the recommended rate will mean there will be a 12% increase in dry matter production compared to applying no Pro Gibb.

6

Supporting evidence:

Nufarm LTD has carried out a number of replicated field trials. The script reads “where Pro Gibb was applied according to label directions the average response from Pro Gibb was an extra 310 Kg DM/ha over untreated controls. Pasture responses are reliable if label directions are met”. This backs up our results as its supports using the advised application rate; our average response from Pro Gibb was an extra 284.2 Kg DM/ha over untreated controls. Using the required concentration is essential for optimum production.

5