

FINAL REPORT

EVALUATION OF BIOWASH SOIL AND BIOWASH PLANT ON SOIL AND PLANT NUTRIENT CONTENT

INSTITUT PENYELIDIKAN DAN KEMAJUAN PERTANIAN MALAYSIA
(MARDI)

BIOWASH



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1. Project Title

Evaluation of BioWash Soil and Biowash Plant on soil and plant nutrient content

2. R&D Centre & Programme

Center: Crop and Soil Science Research Centre

Programme: Plant, Soil and Water Management Programme

3. Client's Name

BioWash Sdn.Bhd.

No. 15, Jalan SS2/ 49

47300 Petaling Jaya

Selangor, Malaysia.

Website: www.BioWashasia.com

Company registration no.: 1058044-W

Contact Person: Agnes Lo

HP: +6012- 9111765

Email: mmbal118@hotmail.com



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EXECUTIVE SUMMARY

Two types of BioWash products had been used in this evaluation namely BioWash Soil (soil amendment) and BioWash Plants (foliar spray). Both of the BioWash products are 100% blended from more than 30 types of plant extracts such as vegetable oil, corn oil and coconut oil. All BioWash products do not contain any cancer causing ingredients, making them a very safe product to use. The evaluation results on soil and plant nutrient content are summarised as follows:

i. Soil and plant nutrient content

In this trial, the pH, cation exchange capacity (CEC) and nutrient content are the dominant limiting factors for soil health and crop production. Thus, the soil chemical changes which determine the soil health can be summarised as:

- BioWash Soil used has the ability to increase soil pH to optimum level as well as the current practice used by farmers.
- BioWash gives better effect on the addition of soil nutrients like potassium/ kalium (K), sodium (Na) and magnesium (Mg).
- For the capacity to hold exchangeable cations (CEC), the effect of BioWash for the changes in CEC from 5 to 30 days of treatment did not show any significant difference in comparison with the other treatments. However, we have to bear in mind that CEC is very slow and difficult to increase significantly.

The overall results of the study on soil and plant total nutrients indicated that the efficacy of Biowash in soil chemical changes has good potential in increasing soil pH to the target value, for the sustainability of soil macronutrients and total plant nutrients content (especially K, Na, Ca, Mg).

ii. Yield

The effect of BioWash treatment on spinach fresh yield for both season's harvest showed that BioWash Soil at 3 mL/L + NPK (T5) and combination treatments of BioWash Soil and Plant + ½ NPK (T3) respectively produced the highest fresh yield at 3.71 and 2.28 kg/m².

Based on this study, BioWash as a new alternative for soil amendment showed comparable performance with current practices and has potential for increasing soil health and crop production.

PROJECT REPORT

1.0 PROJECT TITLE

Evaluation of BioWash soil amendment and BioWash for plant on soil and plant nutrient content

1.1 Project Objectives

- i. To assess the effects of BioWash treatment on soil and plant nutrient content.
- ii. To evaluate the efficacy of BioWash on yield performance of spinach.

1.2 Location

Glass house at Organic Farm, MARDI Serdang, Selangor.

2.0 RESEARCH APPROACH AND METHODOLOGY

This project aims to test the effectiveness of BioWash as soil amendment and foliar spray. The experiment had been carried out in glass house for two seasons. The effectiveness of the product was determined from pot trial results and laboratory analysis in relation to crop yield and soil improvements. Three parameters that had been carried out are listed below:

- 1) Soil chemical status
- 2) Total plant nutrient content
- 3) Yield

2.1 Glass House Experiment (Pot trial)

2.1.1 **Number of cropping cycle:** 2 cycles

2.1.2 **Experimental design:** CRD with 4 replicates for spinach

(Total: 5trt x 4rep = 20 polybags)

Spinach	Treatment 1	Treatment 4	Treatment 5	Treatment 2
	Treatment 3	Treatment 2	Treatment 1	Treatment 4
	Treatment 5	Treatment 1	Treatment 3	Treatment 5
	Treatment 2	Treatment 3	Treatment 4	Treatment 1
	Treatment 4	Treatment 5	Treatment 2	Treatment 3

2.1.3 Treatment

Treatment	Application
T1	Lime (5 t/ha) + NPK fertilizer (Control)
T2	BioWash Foliar (2mL/L) + NPK fertilizer
T3	BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + ½ NPK fertilizer
T4	BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + NPK fertilizer
T5	BioWash Soil (3mL/L) + NPK Fertilizer

2.1.4 **Crop establishment:** Standard agronomic practices

2.1.5 **Test crop:** Spinach

2.1.6 **Pot size:** 9" x 9" polybag

2.1.7 **Variety:** Amaranth-round leaf

2.1.8 **Type of soil:** infertile soil (heavy clay)

2.1.9 **Fertilizer (NPK) application:** At 2-weeks interval throughout the cropping

season.

3.3 Yield

Fresh yield data of spinach per square meter from both seasons were shown in Table 8 and 9 respectively. For the first season, there were significant differences in term of yield among the treatments in which BioWash Soil at 3 mL /L (T5) showed the highest fresh yield with 3.71 kg/m² compared to other treatments. The difference in percentage and value of spinach for all treatments compared to current practice for season 1 is shown in Table 8. BioWash Soil at 3 mL /L (T5) showed the highest difference percentage with 142.48% and in term of economic value with RM 5.45 compared to current practice (T1).

Table 8: Efficacy of BioWash on spinach fresh yield (season 1)

Treatment	Fresh Yield (kg / m ²)	Percentage difference (%)	Difference in value at RM 2.50/kg spinach (RM)
T1: Lime (5 t/ha) + NPK fertilizer (Control)	1.53 b	-	-
T2: BioWash Foliar (2mL/L) + NPK fertilizer	1.75 b	14.38	0.55
T3: BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + ½ NPK fertilizer	2.10 b	37.25	1.43
T4: BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + NPK fertilizer	2.42 ab	58.17	2.23
T5: BioWash Soil (3mL/L) + NPK Fertilizer	3.71 a	142.48	5.45

Means followed by the same letter are not significantly different using Duncan's Multiple Range Test ($P=0.05$)

For the second season yield (Table 9), the treatments with combination of BioWash Soil at 3 mL /L and BioWash Foliar at 2 mL /L followed by NPK which had been reduced into half rate (T3) differed significantly compared to other treatments. It showed the highest fresh yield with 2.28 kg/m² with percentage difference 67.65% and economic value difference with RM 2.30 compared to current practice (T1).

Table 9: Efficacy of BioWash on spinach fresh yield (season 2)

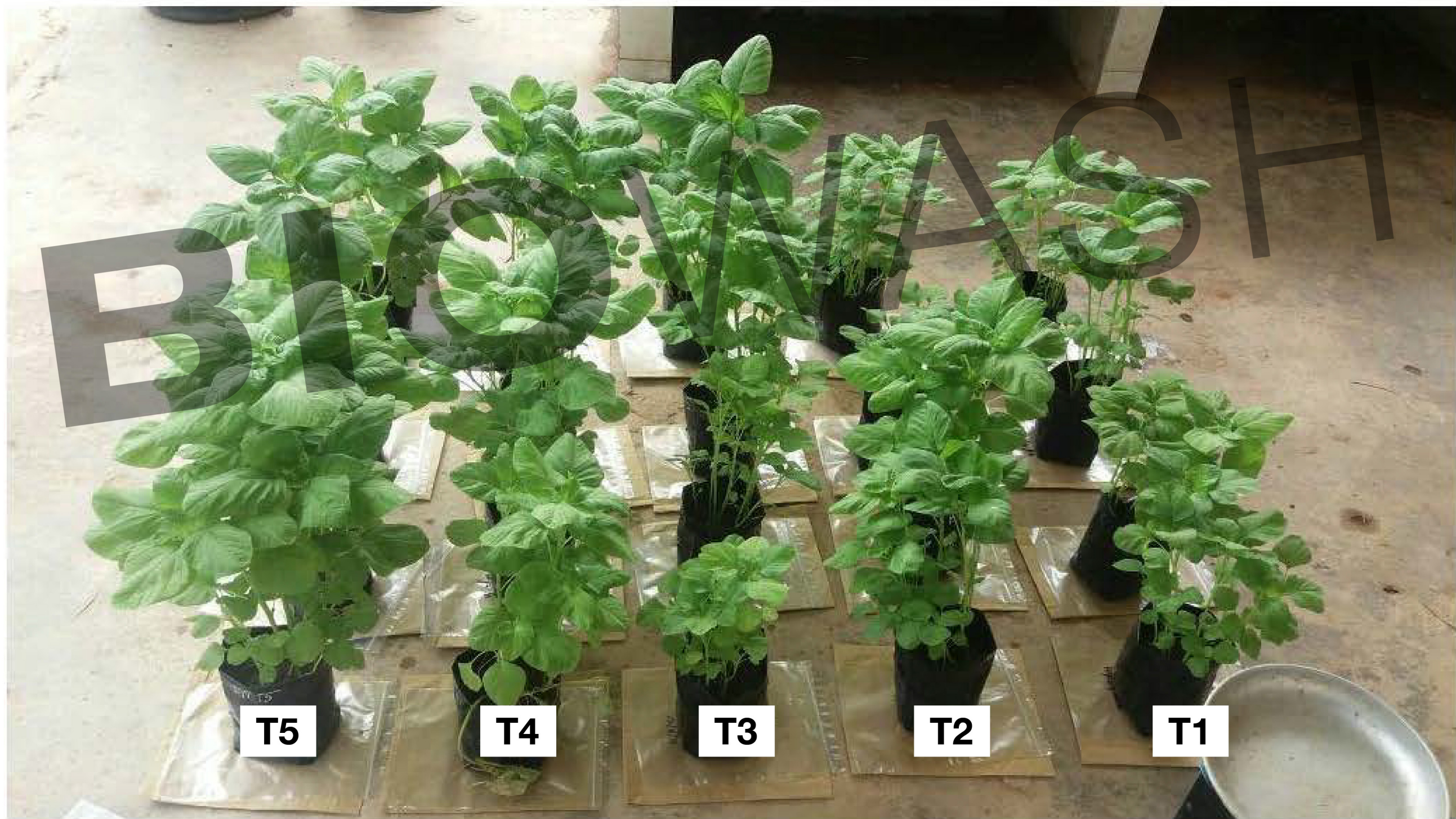
Treatment	Fresh Yield (kg / m ²)	Percentage difference (%)	Difference in value at RM 2.50/kg spinach (RM)
T1: Lime (5 t/ha) + NPK fertilizer (Control)	1.36 ab	-	-
T2: BioWash Foliar (2mL/L) + NPK fertilizer	0.88 b	-(35)	-(1.20)
T3: BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + ½ NPK fertilizer	2.28 a	67.65	2.30
T4: BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + NPK fertilizer	1.31 ab	-(3.68)	-(0.13)
T5: BioWash Soil (3mL/L) + NPK Fertilizer	1.62 ab	19.12	0.65

Means followed by the same letter are not significantly different using Duncan's Multiple Range Test ($P=0.05$)

BIOWASH

T1	Lime (5 t/ha) + NPK fertilizer (Control)
T2	BioWash Foliar (2mL/L) + NPK fertilizer
T3	BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + ½ NPK fertilizer
T4	BioWash Soil (3mL/L) + BioWash Foliar (2mL/L) + NPK fertilizer
T5	BioWash Soil (3mL/L) + NPK Fertilizer

APPENDIX



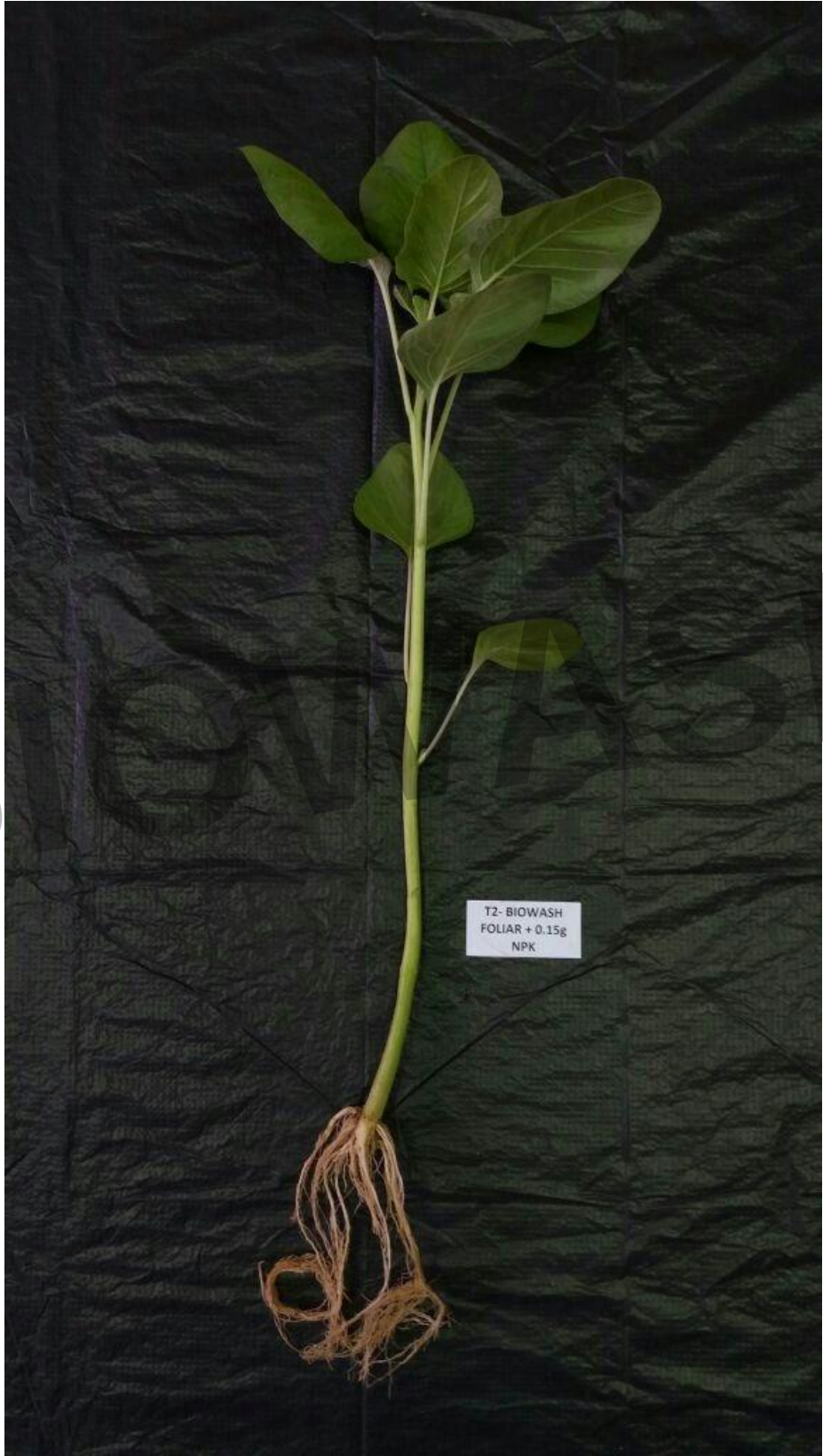
Appendix 1: Spinach at harvesting day



Appendix 2: Different treatment effect on spinach growth; (a) T1, (b) T2, (c) T3, (d) T4, (e) T5



Appendix 3: T1 (control) treated spinach



Appendix 4: T2 (Biowash Foliar + NPK) treated spinach



Appendix 5: T3 (BioWash Soil + Biowash Foliar + ½ NPK) treated spinach

B

H



Appendix 6: T4 (BioWash Soil + Biowash Foliar + NPK) treated spinach



Appendix 7: T5 (BioWash Soil + NPK) treated spinach