BioAg Demonstration

BioAg Sri Lanka Brinjal Trial 2011

Sri Lanka	**2010-2011**
Location	Year
University of Peradeniya	**Brinjal / Eggplant**
Conducted by	Crop
Replicated Plots	
Trial Type	

Trial Objectives

- To measure the economic benefits of BioAg technology in Sri Lankan vegetable cultivation.
- To identify and measure the economic and agronomic benefits of *BioAgPhos* as a source of phosphorus in vegetable cultivation (brinjal).
- To identify and measure the economic and agronomic benefits of BioAg *Soil & Seed* and other BioAg liquid fertilisers in vegetable cultivation.

Trial Design

- Randomised Block Design
- Number of Treatments – 4
- Number of Replications – 4
- Planting Date – 12th November 2010
- Brinjal Variety 1 (V1) – Lenari
- Brinjal Variety 2 (V2) – Ravenna
- Harvesting – once a week

Treatments

Table 1 – Trial Treatments (rate per ha)

Trial Treatments		Fertiliser Cost per ha (LKR)
T1	Urea 165kg + TSP 325kg + MOP 130kg	14,880
T2	*BioAg N* 123.75kg + TSP 325kg + MOP 130kg	14,014
T3	*BioAg N* 123.75kg + TSP 80kg + *BioAgPhos* 400kg + MOP 130kg + *S&S* 4Lts	22,134
T4	*BioAg N* 123.75kg + TSP 80 + *BioAgPhos* 400kg + MOP 130kg + *S&S* 4Lts + *B&G* 2Lts + *F&B* 2Lts	26,934

T1 is the recommended fertiliser application by Agriculture Department in Sri Lanka ('Control').

TSP is TripleSuperphosphate

MOP is Muriate of Potash

BioAg N is Urea coated with a natural oil based product formulated to inhibit nitrogen volatalisation.

BioAgPhos is reactive phosphate rock innoculated with a phosphate digester.

S&S is *Soil & Seed* improves soil structure, thereby increasing nutrient and moisture retention in the soil, and greatly reducing the amount of nutrient lost through leaching. It encourages rapid germination and early root development, and helps buffer the crop against stresses such as pest, heat/drought and disease.

B&G is *Balance & Grow* formulated to increase vegetative growth, root development and soil microbial activity. It provides plants and soils with the appropriate nutrients to stimulate and support plant growth, particularly calcium and phosphate. Early plant growth is critical in optimising yield potential.

F&B is *Fruit & Balance*, formulated to increase flowering, fruit set and soil microbial activity. Delivers a rich source of plant available phosphate when the plant is under peak load, stimulating strong fruiting and enhancing yield potential. *Fruit & Balance* also enhances the nutritional value and quality of fruit by increasing sugar levels in the plant.

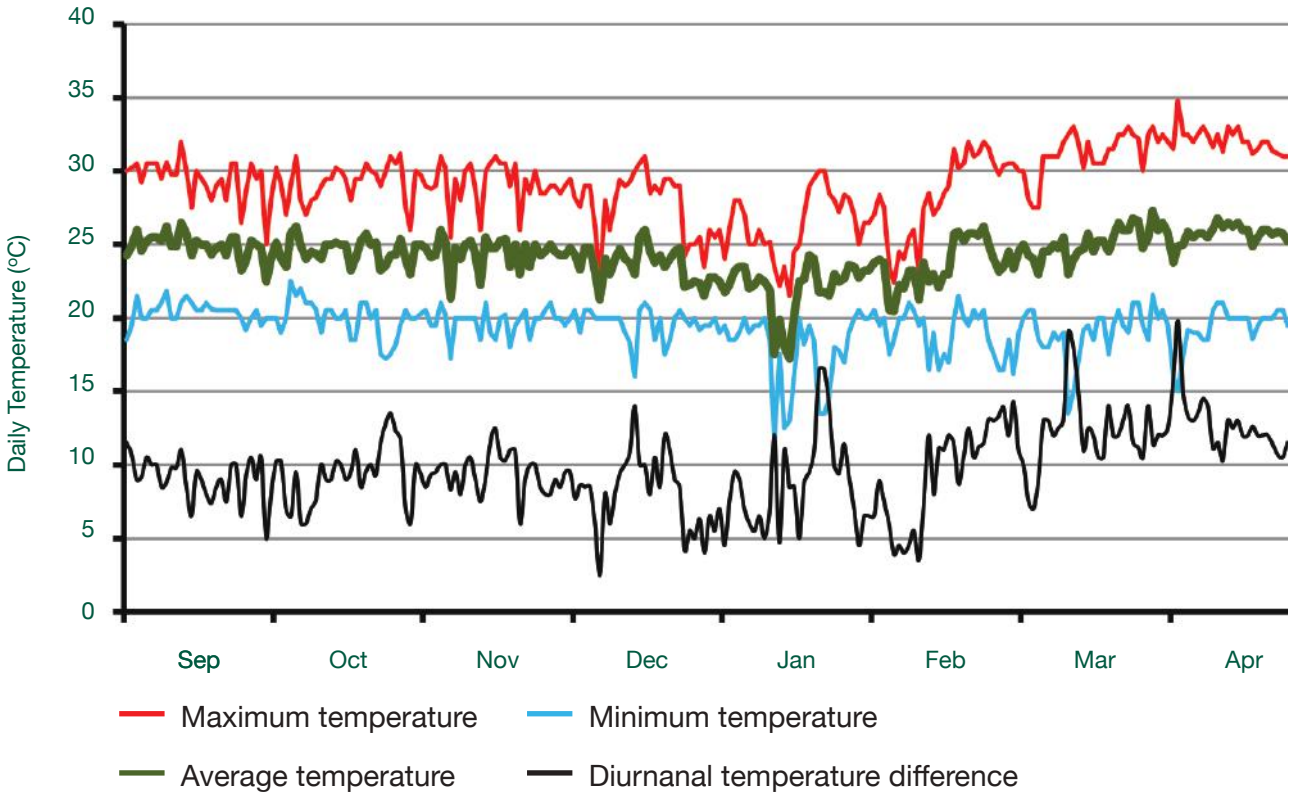
Trial Site – Detailed Information

Agro ecological zone – Mid country intermediate zone in Sri Lanka.

Environmental conditions during the experimental period –

Temperature

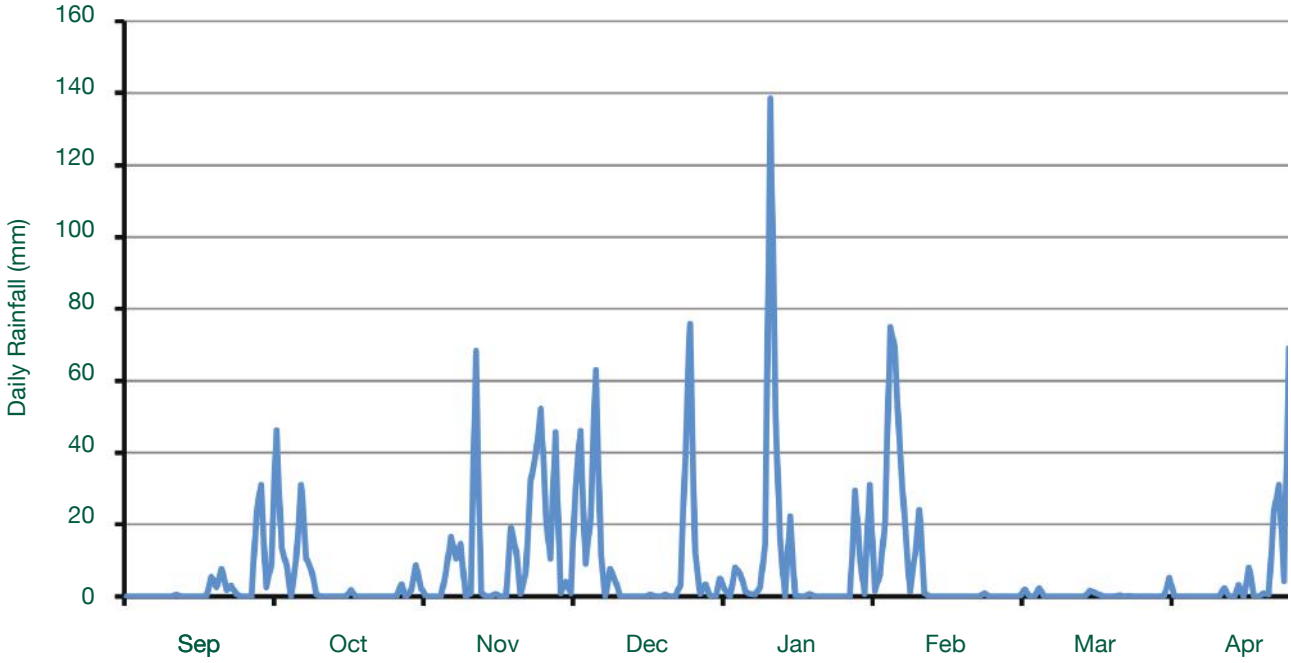
Figure 1 – Daily temperature (°C) variation from September 2010 to April 2011



Time period in months from September 2010 – April 2011.

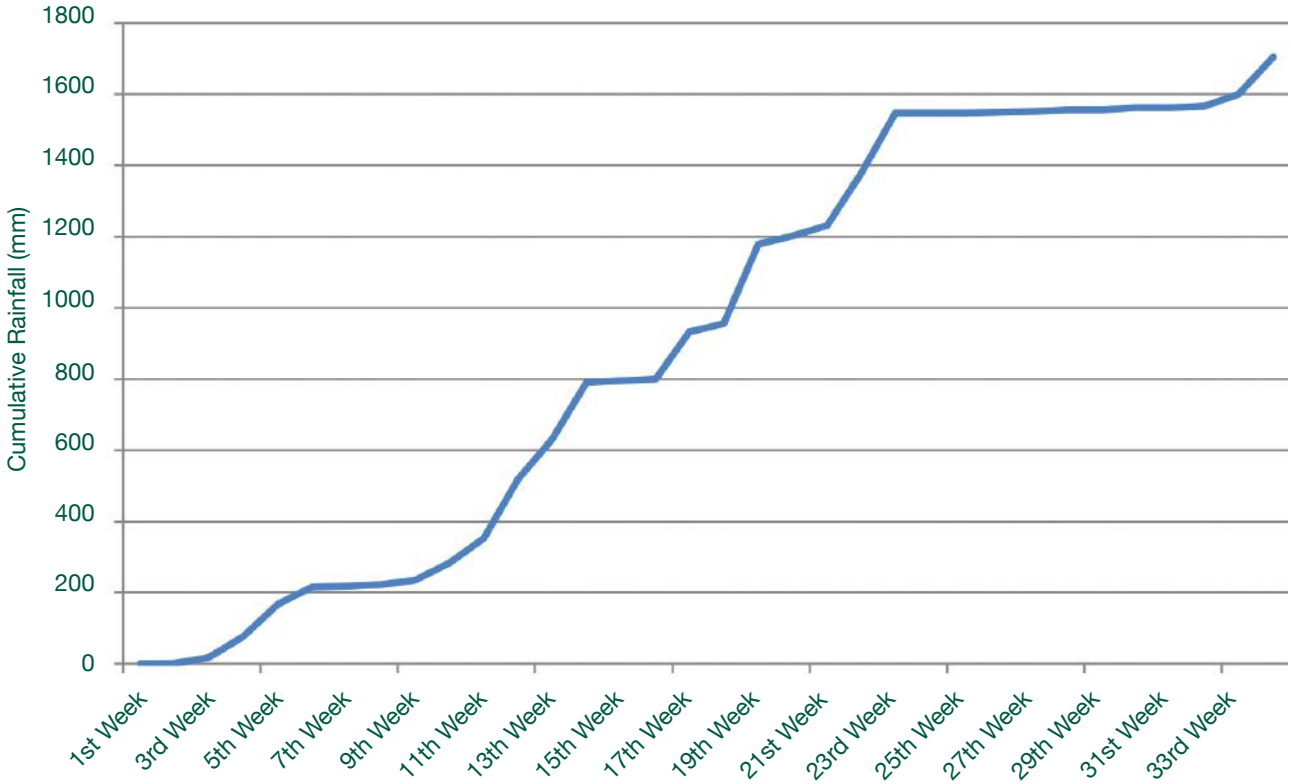
Rainfall

Figure 2 – Daily rainfall variation (mm) during September 2010 to April 2011



Time period in months from September 2010 – April 2011.

Figure 3 – Cumulative rainfall (mm) during September 2010 to April 2011



Time period in weeks from September 2010 – April 2011.

Seasonal weather conditions

The program was commenced in mid-November 2010. Favorable weather conditions at the trial site facilitated the establishment of plants. During the period between early December and mid-February, Sri Lanka had very heavy rainfall and the trial area was completely submerged during this period. Heavy rainy conditions persisted for approximately six to eight weeks from late December to mid-February, and all crops were affected due to a) the anaerobic nature of the soil, b) low light level, c) erosion. This anaerobic condition is not beneficial in any fertiliser application. One must assume that a significant portion of the applied nutrients were likely to have been washed out by the runoff water. Due to this heavy rain fall, some management practices, such as weeding and pesticide application were unable to be carried out at the right time. Unusually cold weather and cloudy conditions limited the crop growth and fruiting.

Soil Conditions at the Trial Site

Soil type – Reddish brown latosolic

pH Value	6.69
Electrical Conductance (µS cm-1)	35.4
% Organic Carbon	0.85
% Organic Matter	1.47
Yield mt/ha NH_4^+	67.48
Yield mt/ha NO_3^-	90.63

Results

Plant height

The distribution of plant height in both the varieties (V1) and (V2) are presented in Figures 8 and 9, and in Table 2. Statistical analysis of the plant height measurement at 60 days after planting (DAP) indicates a significant interaction between V & T. The two varieties behaved significantly different (in plant height).

The treatment effect was significant on plant height in both varieties. Mean comparisons indicate that T4 (*BioAg N* + TSP + *BioAgPhos* + MOP + *S&S* + *B&G* + *F&B*) and the control treatment (T1) were the most effective treatments with respect to plant height. In the meantime remaining two treatments T2 & T3) had low plant height. The plant height was lowest in T2. The hybrid variety (Raveena) was relatively shorter than the variety Lenari.

Figure 8 – Mean brinjal growth (cm) local variety (Lenari V1)

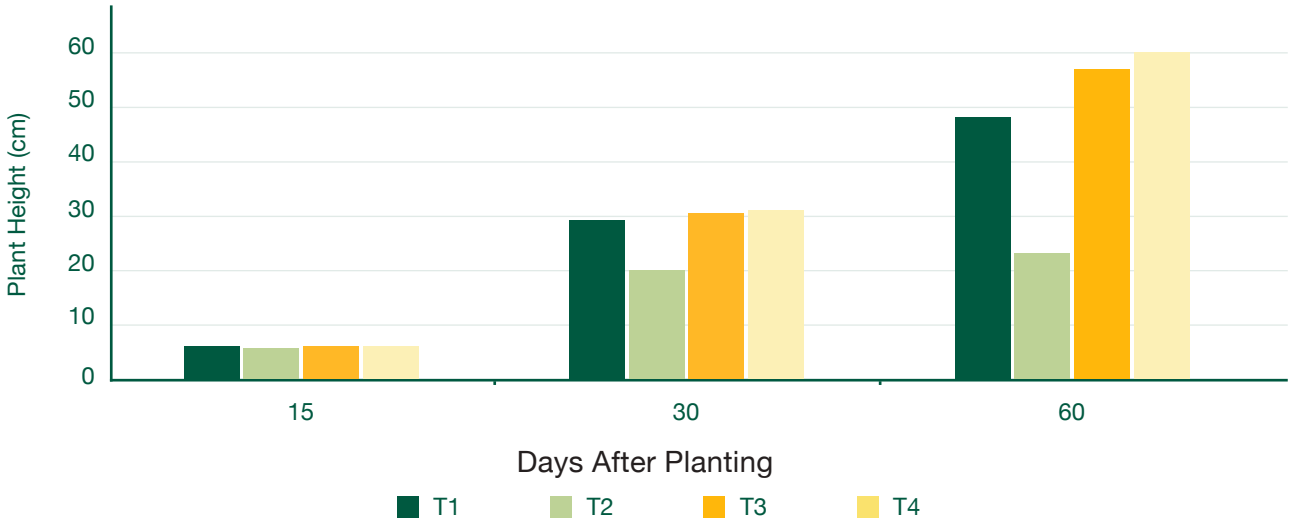


Figure 9 – Mean brinjal growth (cm) hybrid variety (Raveena V2)

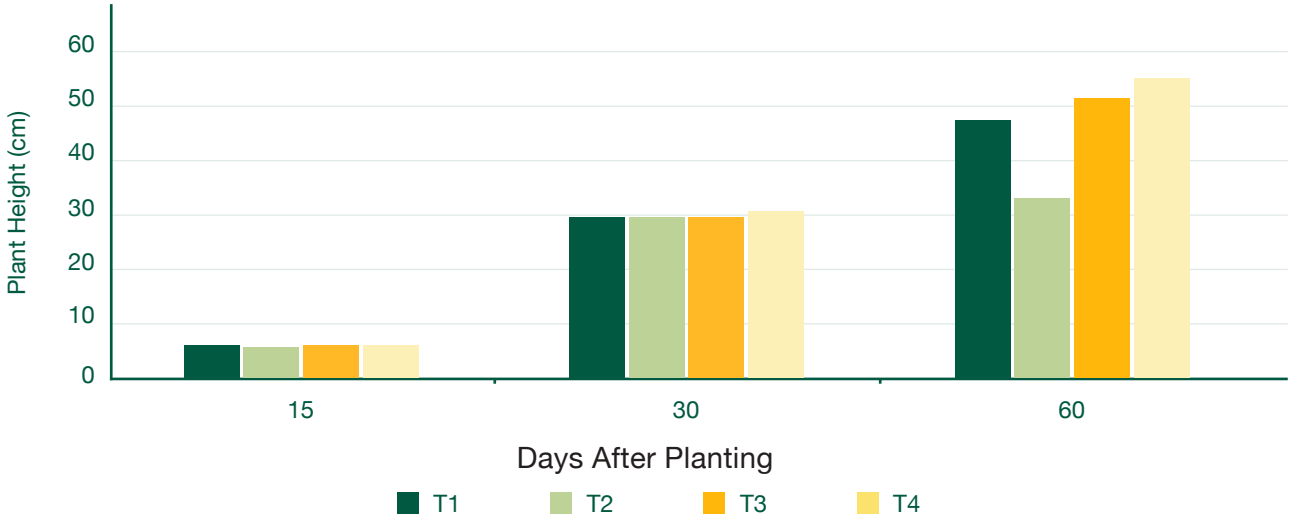


Table 2 – Variation of plant height (cm) of local and hybrid brinjal varieties as affected by different fertiliser treatments at 60 DAP

Treatment	V1	V2	Mean Height
T1	48.8	47.9	48.4[a]
T2	45.9	34.5	40.2[c]
T3	46.7	41.5	44.1[b]
T4	50.4	45.2	47.8[a]
Mean	47.95[a]	42.31[b]	–

Means values with same letter in the last column and the last row respectively are not significantly different at p=0.05 probability level.

Days taken to 50% flowering

The time taken for 50% flowering is presented in the Figure 10 and Table 3. The analysis indicates that the variety and fertiliser levels, or their interactions, were not significantly different for 50% flowering.

Figure 10 – Time taken (DAP) for 50% flowering of brinjal under different treatments

Treatment

Table 3 – Number of days taken from planting to 50% flowering of brinjal as affected by different treatments

Treatment	Local Variety	Hybrid Variety	Mean Days for 50% Flowering
T1	74.5	74.5	74.5[a]
T2	74.5	74.5	75.0[a]
T3	74.0	73.2	73.6[a]
T4	74.5	73.2	73.9[a]
Mean	74.4[a]	73.8[b]	–

Values with same letter in the last column and the last row respectively are not significantly different at p=0.05 probability level.

Brinjal Yield (Total of seven non-destructive harvests)

The distributions of brinjal yield (of Varieties V1 & V2) under different fertiliser applications are given (for the first seven picks) in figures 11 & 12; and the cumulative yield in figures 6 and in Table 3, respectively.

The 4th, 5th and 6th harvests achieved better yields than the other harvests.

Figure 11 – Variety (V1) brinjal mean yield (T/ha) per seven picks

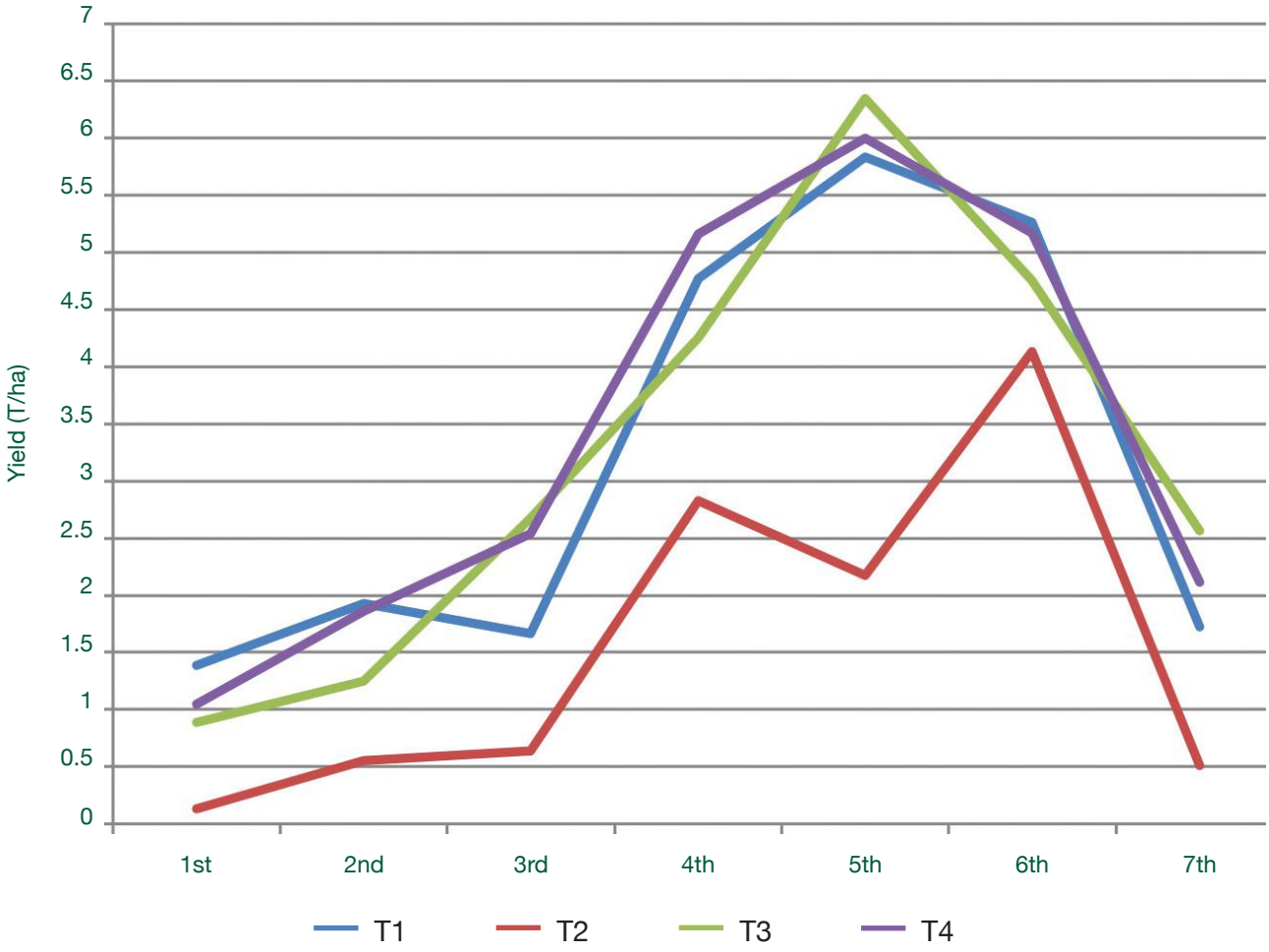


Figure 12 – Variety (V2) brinjal mean yield (T/ha) per seven picks

Figure 13 – Brinjal mean yield (T/ha) per seven pluckings

Table 4 – Variation of brinjal yield (T/ha) cumulative of seven picks of local and hybrid varieties as affected by different fertiliser treatments

Treatment	Local Variety Yield	Hybrid Variety Yield	Mean Yield
T1	22.58	22.55	22.56[a]
T2	11.20	14.60	12.9[b]
T3	22.70	21.00	21.85[a]
T4	23.88	26.75	25.31[a]
Mean	20.08[a]	21.23[a]	–

Values with same letter in the last column and the last row respectively are not significantly different at p=0.05 probability level.

The analysis of cumulative yield shows that there were no significant varietal effects however the fertiliser treatments had significant effect (P=0.0012). T1, T3 and T4 recorded higher cumulative yields than T2. Treatment T4 had the highest yield, which was 6% better in V1 and 18% better in V2 compared with the control fertiliser application (T1).

Economic Benefits

Table 5 – Cost analysis of variety 1 in different fertiliser applications

	Fertiliser cost per ha (LKR)	Yield (T/ha)	Gross Revenue (LKR per ha)	Net Revenue (Gross – Fertiliser cost) (LKR per ha)
T1	14,880	22.58	790,300	775,420
T2	14,014	11.20	392,000	377,986
T3	22,134	22.70	794,500	772,366
T4	26,934	23.88	835,800	808,866

Value of variety 1 per tonne: LKR 35,000

Table 5 – represents the economics of the brinjal trial for Variety V1, which indicates T4 had the best yield followed by T3. Both Gross Revenue and Net Revenues are substantially higher in T4 compared with T1 (4.3% higher in T4).

Table 6 – Cost analysis of variety 2 in different fertiliser applications

	Cost per ha (LKR)	Yield (T/ha)	Gross Revenue (LKR per ha)	Net Revenue (Gross – Fertiliser cost) (LKR per ha)
T1	14,880	22.55	789,250	774,370
T2	14,014	14.60	511,000	496,986
T3	22,134	21.00	735,000	712,866
T4	26,934	26.75	936,250	909,316

Value of variety 2 per tonne: LKR 35,000

The economics of Variety 2 are shown in Table 6. According to the results, the yield was better in T4, followed by T1. Gross and Net Revenues were substantially better in T4 compared with the control T1 (17% higher in T4).

Fertiliser applications T3 and T4 have shown consistent results with both the varieties, and have demonstrated improved yields.

Discussion

This trial demonstrates that the BioAg fertiliser applications offer multiple benefits in vegetable cultivation, such as a) increased yield, b) increased revenue and c) improved quality. The results indicate that the BioAg treatments have improved the average fruit size, although this was not quantified in this trial.

The BioAg fertiliser application T4 has shown yield, quality and revenue benefits compared with the control fertiliser application in Sri Lanka.

The treatment T4 application had *BioAgPhos* as the phosphorus fertiliser and BioAg *Soil & Seed* as the soil conditioner, followed by BioAg foliar applications.

Figure 14 – This figure compares the effect of fertiliser treatment on quality attributes

Fertiliser Prices (retail) in Sri Lanka (LKR) per Ton

The economic benefits were calculated using the prices listed below.

Urea – 24,000
TSP – 24,000 (Triple Super Phosphate)
MOP – 24,000 (Muriate of Potash)

Sri Lanka has recently subsidised all the above fertilisers for all agricultural crops in Sri Lanka. The above prices are the subsidised retail prices.

BioAgPhos – 35,000 (A$350)
Soil & Seed – 600 per L (*S&S*)
Balance & Grow – 600 per L (*B&G*)
Fruit & Balance – 600 per L (*F&G*)
BioAg N – 200 per L (treatment 5L/t)

For the purposes of the above calculations, the market value of fresh brinjal was assumed to be LKR 35,000 per tonne.

Crop Trial Undertaken by University of Peradeniya, Sri Lanka, (Faculty of Agriculture-Department of Crop Science) in Collaboration with BioAg Pty Ltd (Australia).

Trial dates

Commencement – 12th November 2010
Completion – 15th April 2011

Project manager

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