



Growth Performance of Xiaobaicai (*Brassica chinensis*) Transplanted from Light-Stressed Seedlings

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Objective

To study the growth performance of Xiaobaicai (XBC) transplanted from seedlings grown under different light intensity, with the aim to identify the optimal light condition to grow seedlings*

(*Trial was carried out at former AVA's Sembawang Research Station, Nov-Dec 2015)

Materials and Methods

Experimental Design

- ❖ XBC seeds were sown into seed plug trays and subject to the following treatments in Greenhouse* A for 14 days: **0% shade (Control), 25% shade, 44% shade, and 64% shade**. (*Greenhouse (GH) had Polyethylene-roof and netted sides)
- ❖ After 14 days in Greenhouse A, seedlings were transplanted into soil cultivation beds in Greenhouse B at plant spacing of 10cm x 10cm. There were 30 plants per treatment with 3 replicates.
- ❖ The vegetables were maintained under the following regime:

	Greenhouse A	Greenhouse B
Watering frequency	Overhead sprinklers - 3 times/day @ 3 mins duration	
Application of organic basal fertilizer	-	On day 7 @1.5 kg/sqm
Application of foliar fertilizer	On day 7 @ 4g/ltr water	-
Application of pelleted NPK fertilizer	-	On day 16 & day 23 @15g/sqm

Data Collection

- ❖ Day 1-13: Daily Light Integral (DLI), Temperature and Relative Humidity (RH)
- ❖ Day 14: Seedling Length, Leaf Length, Leaf Width, Number of Leaves and Chlorophyll SPAD (Soil Plant Analysis Development) Reading.
- ❖ Day 30: Plant Weight, Plant Length, Leaf Length, Leaf Width, Number of Leaves and Chlorophyll SPAD Reading.

Results

	DLI (mol.m ² d ⁻¹)	Day Temp (°C) (7am-7pm)	Night Temp (°C) (7pm-7am)	24-hrs Temp (°C)	Day RH (%) (7am-7pm)	Night RH (%) (7pm-7am)	24-hrs RH (%)
Outside GH	45	33.7 (23.5 – 47.5)	25.2 (23.5 – 28.5)	29.2 (23.5 – 47.5)	74.1 (50.5 – 100)	94.8 (80.0 - 100)	85.1 (50.5 – 100)
Control	36	35.3 (24.0 – 52.0)	25.4 (23.5 – 29.0)	30.1 (23.5 – 52.0)	73.9 (43.0 – 98.5)	94.4 (77.5 – 98.5)	84.7 (43.0 – 98.5)
25% Shade	27	35 (24.5 – 51.0)	25.8 (24.0 – 29.5)	30.1 (24.0 – 51.0)	78.2 (44.0 – 99.5)	95.5 (78.5 – 99.5)	87.3 (44.0 – 99.5)
44% Shade	20	34 (24.0 – 49.5)	25.6 (24.0 – 29.0)	29.5 (24.0 – 49.5)	79.3 (47.0 – 99.5)	95.7 (78.5 – 99.5)	87.9 (47.0 – 99.5)
64% Shade	13	32.9 (24.5 – 46.5)	25.7 (24.0 – 29.5)	29.1 (24.0 – 46.5)	84.7 (46.5 – 97.5)	94.3 (75.5 – 97.5)	89.7 (46.5 – 97.5)

Average DLI, Temperature and RH in Greenhouse A from Day 1–13

	Control			25% Shade			Δ	44% Shade			Δ	64% Shade			Δ
Plant length (cm)	5.40	±	0.66	5.90	±	0.48	9%	7.70	±	0.65	43%	7.10	±	0.44	31%
Leaf length (cm)	2.80	±	0.32	3.30	±	0.29	18%	3.70	±	0.51	32%	3.40	±	0.25	21%
Leaf width (cm)	1.40	±	0.25	1.50	±	0.14	7%	1.70	±	0.22	21%	1.50	±	0.24	7%
No. of leaves	4.00	±	0.42	4.00	±	0.63	0%	3.00	±	0.48	-25%	3.00	±	0.48	-25%
Chlorophyll spad reading	34.50	±	4.13	32.10	±	3.19	-7%	33.90	±	1.94	-2%	33.00	±	2.12	-4%

Growth Parameters of XBC Seedlings Recorded on Day 14 (Average of 10 Seedlings)



Control (0% shade)



25% shade



44% shade



64% shade

Appearance of XBC Seedlings in Greenhouse A on Day 14

	Control			25% Shade			Δ	44% Shade			Δ	64% Shade			Δ
Plant weight (g)	38.33	±	4.41	40.00	±	5.00	4%	38.33	±	6.67	0%	31.67	±	7.95	-17%
Plant length (cm)	23.08	±	0.19	22.90	±	0.22	-1%	22.15	±	0.88	-4%	22.13	±	0.89	-4%
Leaf length (cm)	14.08	±	0.08	14.47	±	0.19	3%	13.83	±	0.35	-2%	13.55	±	0.23	-4%
Leaf width (cm)	8.83	±	0.16	8.93	±	0.29	1%	8.68	±	0.30	-2%	8.63	±	0.39	-2%
No. of leaves	12.90	±	0.95	13.37	±	0.93	4%	12.23	±	1.11	-5%	12.13	±	0.78	-6%
Chlorophyll spad reading	33.72	±	0.38	33.91	±	0.58	1%	33.43	±	0.60	-1%	33.38	±	0.14	-1%

Growth Parameters of XBC Plants Recorded on Day 30 (Average of 30 Plants)



Control



25% Shade



44% Shade



64% Shade

Appearance of XBC Plants on Day 30 in Greenhouse B

Summary

- ❖ XBC vegetables harvested from 25% shade (DLI of 27 mol.m².day⁻¹) had the highest average plant weight of 40g, which was 4% more than Control and 44% shade (both 38.3g).
- ❖ Vegetables from 64% shade (DLI of 13 mol.m².day⁻¹) had the lowest average plant weight of 31.7g – a reduction of 17% compared to Control.

Conclusion

- ❖ XBC seedlings raised under low DLI of 13 mol.m².day⁻¹, e.g. under two layers of black shade cloth, could lead to significant reduction in plant yield at harvest.
- ❖ XBC seedlings raised under some shade with DLI between 20 – 27 mol/m²/day, e.g. one layer of white or black shade cloth, could result in similar or higher yield at harvest to without shade.