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Research Article
Response of Two Fig (*Ficus carica* L.) Varieties after Receiving Brassinolide on Leaf, Shoot and Root Segment

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Abstract
Background and Objective: The increase in growth after receiving brassinolide may vary between species. The main growth factors which may directly reflect to yield are functional leaf, shoot and root segment. Thus, the aim of this study was to investigate the effect of different concentrations of exogenous application of BL on growth of leaves, shoots and roots segments of fig. **Materials and Methods:** The experiment was arranged as Split Plot Randomized Complete Block Design (SRCBD) with 4 replications. Two fig cultivars Improved Brown Turkey (IBT) and Masui Dauphine (MD) were considered as a main plot and four level (0, 50, 100 and 200 mL L^{-1}) of BL concentration as a sub plot. Experiment was conducted in an open field at Ladang 15, Faculty of Agriculture, University Putra Malaysia Serdang, Selangor, Malaysia, from May-December, 2017. Data was recorded weekly and monthly. **Results:** The results showed that growth of fig was affected by brassinolide levels and cultivars. Application of 50-200 mL L^{-1} BL increased growth of fig on leaves, shoots and roots segments in weekly and monthly observations. There was significant difference treatment of brassinolide and cultivar alone on growth of fig. In average, concentration of brassinolide at 200 ML L^{-1} resulted highest growth performance of fig. The highest growth value of interaction between brassinolide and fig variety was on treatment of IBT+200 ML L^{-1}. Between the varieties, IBT showed higher growth than MD. Significant negative correlation was noted only on between RL with RAD. **Conclusion:** The results of this study indicated that growth of fig on leaves, shoots and roots segments was affected by brassinolide levels and cultivars.

Key words: Brassinolide, cultivar, *Ficus carica*, fig, improved brown Turkey, masui dauphine, morphological development

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Competing Interest: The authors have declared that no competing interest exists.

Data Availability: All relevant data are within the paper and its supporting information files.

INTRODUCTION

Two fig varieties, Improved Brown Turkey (IBT) and Masui Dauphine (MD) have different effect on growth after receiving different concentrations of brassinollide[1]. Brassinolide is one of the brassinosteroids, which are steroidal plant hormones showing a wide occurrence in the plant kingdom, that have unique biological effects on growth and development[2,3]. Plant species may differ considerably in biomass production. The maximum growth after receiving brassinolide may vary between species. The functional leaf, shoot and root segment are the main growth factor which may directly reflect to yield.

Plants grow by the process of cell division or mitosis followed by cell enlargement and maturation. Cells then differentiated into tissues that make up the organs of the plant. Mitosis includes replication of organelles, synthesis of nuclear material and enzymes, etc. Cell enlargement consists largely of water uptake to form a large vacuole. Growth may be measured as change in mass, volume or length of shoot or root[4].

Root elongation and branching are iterative processes in root development[5-7]. Variations in the attributes of elongation and branching create morphological differences in the lengths, numbers and diameters of different-order roots within the root system[8,9]. Many plant species have root system architectures with a majority of very fine roots. These tend to optimize the ratio of root length (hence root surface area for uptake) to root weight (investment). However, decreased root diameter limits root penetration through the soil[10,11] and roots must also develop internal structures dedicated to water and nutrient transport[12,13].

Water, sunlight, carbon dioxide, oxygen and mineral elements from the soil are well known to be essential for sustained plant growth. If any of these things are deficient in the environment or present in excess (toxic amounts), plants may become stressed and even die, but plants have adapted to life in a variety of conditions[14]. Plants may play a role in modifying their environment and climate[15]. In addition, plants have complex relationships with other organisms in their communities including herbivores, pathogens, parasites, symbiotic or free-living nitrogen-fixing bacteria and mycorrhizae. All of these factors can affect the rate of plant growth.

The shoot is the production center for a plant. It is the organ system that gives rise to stems, leaves and flowers. Leaves are the major sites of photosynthesis in most plants. They are joined to the stem via a petiole and extend from the stem at nodes. While leaves of different plants vary greatly in size and shape, they have several similar cellular features that optimize photosynthesis[16]. Examining the organization of plant tissues within a stem highlights these functional characteristics. The organization of these tissue types within a stem varies with the type of plant[17].

There was limited information of brassinolide application on these varieties. Thus, the aim of this study was to investigate the effect of different concentrations of exogenous application of BL on growth of leaves, shoots and roots segments of fig.

MATERIALS AND METHODS

Fig planting materials were propagated using cutting methods and transferred into media containing 3:2:1 mixed soil (top soil: organic matters: sand). The experiment was arranged as Split Plot Randomized Complete Block Design (SRCBD) with 4 replications.

The main plot was fig cultivars (C) consist of two level treatments:

- **C1**: Improved Brown Turkey (IBT)
- **C2**: Masui Dauphine (MD)

The sub-plot was brassinolide concentrations (B) consist of four level treatments.

- **B0**: Without Brassinolide (control)
- **B1**: Brassinolide with dosage 50 ML L^{-1}
- **B2**: Brassinolide with dosage 100 mL L^{-1}
- **B3**: Brassinolide with dosage 200 mL L^{-1}

Experiment was conducted in an open field at Ladang 15, Faculty of Agriculture, University Putra Malaysia, situated at 2°58" N and 101°44'04" E in Serdang, Selangor, Malaysia from May-December, 2017. Data was recorded weekly and monthly.

Determination of number of leaves (NL) and number of shoots (NS): Number of leaves and number of shoots were counting manually.

Determination of leaves fresh weight (LFW), shoots fresh weight (SFW) and roots fresh weight (RFW): Leaves, shoots and roots fresh weight were collected straight from the plant and weight using a sensitive electronic weighing scale (Model CDS 125, Mitutoyo Inc, Japan)[18].

Measuring of shoot length (SL): Shoot length was measured using measuring tape from shoot base until shoot tip[19].

Determination of leaves dry weight (LDW), shoots dry weight (SDW) and roots dry weight (RDW): The plants were separated into leaves, shoots and roots. The plant parts were placed in paper bags and oven-dried at 45°C until constant weight (i.e., 3 days) was reached. Plant total dry weight was taken using a sensitive electronic weighing scale (Model CDS 125, Mitutoyo Inc, Japan)[20].

Determination of root length (RL), root average diameter (RAD) and root volume (RV): Value of root length, root average diameter and root volume were measured by root scanner image analyzer from LICOR, Inc., USA[21].

Statistical analysis: All the data obtained was analyzed by using Statistic Analysis System (SAS) version 9.4, Microsoft Excel 2013 and SPSS 23. Significant difference of mean values was determined and analyzed using two-way ANOVA and the mean differences were compared using Least Significant Different test (LSD) at 1 and 5% level of significance.

RESULTS

Growth of fig on leaves segment: The results of data analysis (Table 1) showed that growth of fig on leaves segment was affected by brassinolide levels and cultivars. Treatment brassinolide alone was significant on Number of Leaves (NL) at 3rd WAT (Week After Treatment) and on Leaves Fresh Weight (LFW) and Leaves Dry Weight (LDW) at first MAT (Month After Treatment). Treatment of the fig plants with different concentrations of brassinolide (B1, B2 and B3) caused an increment in NL at third WAT, LFW and LDW at first MAT compared to control samples. Only NL parameter showed a significant effect treatment of brassinolide alone and cultivar alone at 1% level of significance.

Treatment cultivar alone was significant on NL at 6th, 9th, and 12th WAT on LFW at 4th MAT and on LDW at 3rd and 4th MAT. Among the varieties, C1 showed higher growth than C2 at every five-weekly observations. Interaction between brassinolide concentrations and fig variety were significant only on LFW at third MAT. The highest LFW value of interaction between brassinolide and fig variety was 14.03 g on treatment of C1+B3 and the lowest LFW value of interaction between brassinolide and fig variety was 3.68 g on treatment of C2+B2.

Growth of fig on shoots segment: Application of brassinolide had some effect on growth of fig on shoots segment (Table 2) with significantly varied at weekly and monthly observations. Between the varieties, C1 showed higher growth than C2. Treatment of brassinolide (B1, B2and B3) caused an increment in Number of Shoots (NS), Shoots Length (SL) and Shoots Fresh Weight (SFW) compared to control samples. Increasing the brassinolide concentration (B1 and B3) caused increment in SDW, but it decreased when brassinolide concentration B2. Interaction between brassinolide concentrations and fig variety was significant only on parameter SDW at first MAT. The highest SDW value of interaction between brassinolide and fig variety was 1.62 g on treatment of C1 + B3 and the lowest SDW value of interaction between brassinolide and fig variety was 0.04 g on treatment of C2+ B2.

Growth of fig on roots segment: As essential organ to uptake nutrients, the growth of roots (Table 3) was affected by

Table 1: Growth of fig on leaves segment after receiving brassinolide

	Week after treatment					Month after treatment							
	No. of leaves (Pcs)					Fresh weight (g)				Dry weight (g)			
Treatments	3	6	9	12	15	1	2	3	4	1	2	3	4
B0	7.13^{c**}	10.75	8.88	8.68	3.80	1.48^{b*}	5.46	8.91	4.57	0.35^{b*}	1.60	4.54	3.07
B1	7.75^{bc**}	10.63	9.23	8.23	3.63	3.35^{ab*}	5.13	7.55	8.92	0.79^{ab*}	1.43	3.54	4.78
B2	8.93^{ab**}	9.18	9.93	8.38	3.83	5.37^{ab*}	6.20	7.09	6.45	1.33^{ab*}	1.68	3.35	3.38
B3	10.13^{a**}	9.73	9.48	9.20	4.35	7.77^{a*}	9.03	9.25	8.99	1.89^{a*}	2.17	4.24	5.10
C1	8.90	11.65^{a**}	10.96^{a**}	9.54^{a*}	4.04	6.06	7.46	8.78	5.66^{b*}	1.52	1.91	4.31^{a*}	3.33^{b*}
C2	8.06	8.49^{b**}	7.79^{b**}	7.70^{b*}	3.76	2.93	5.45	7.62	8.80^{a*}	0.66	1.53	3.53^{b*}	4.84^{a*}
C1+B1	8.25	12.55	10.35	8.85	3.45	1.42	7.57	7.92^{ab*}	7.42	0.38	1.87	3.99	4.53
C1+B2	8.00	10.30	11.45	8.50	3.85	6.17	7.13	7.19^{a*}	3.05	1.47	2.01	2.26	2.17
C1+B3	8.90	10.25	11.45	11.45	4.40	7.76	8.18	14.03^{a*}	7.81	2.02	1.99	6.19	3.67
C2+B1	7.25	8.70	8.10	7.60	3.80	1.54	2.70	3.68^{b*}	10.42	0.32	0.99	3.10	5.03
C2+B2	6.25	8.05	8.40	8.25	3.80	0.54	5.27	10.51^{a*}	9.84	0.10	1.35	4.44	4.59
C2+B3	8.95	9.20	7.50	6.95	4.30	7.79	9.88	4.48a*	10.17	1.77	2.34	2.29	6.53
LSDC		1.39	1.82	0.68					2.38			0.71	0.89
LSD B	4.09					5.86				1.52			
LSD C×B								9.83×11.05					

Means values within a column followed by the different small letters are significant at $^{*}p<0.05$ and $^{**}p<0.01$

Table 2: Growth of fig on shoots segment after receiving brassinolide

	Week after treatment										Month after treatment							
	No. of shoots (Pcs)					Length (cm)					Fresh weight (g)				Dry weight (g)			
Treatments	3	6	9	12	15	3	6	9	12	15	1	2	3	4	1	2	3	4
B0	2.28^{b*}	2.66	2.67^{b*}	3.06	3.13	16.44	26.34	32.43	36.83	38.17^{b*}	0.99^{b*}	6.98	25.76	29.98^{b*}	0.54	1.59	14.66	16.96^{c*}
B1	2.40^{b*}	2.72	2.85^{ab*}	3.23	3.25	15.70	23.16	33.87	38.06	44.39^{ab*}	2.56^{ab*}	6.97	24.70	41.31^{a*}	0.13	1.86	12.98	23.14^{b*}
B2	2.25^{b*}	2.38	2.96^{ab*}	3.00	2.75	17.26	24.82	33.76	39.39	41.85^{b*}	2.84^{ab*}	11.59	23.40	31.71^{b*}	0.62	3.31	12.54	18.69^{c*}
B3	2.73^{a*}	2.53	3.08^{a*}	3.02	2.88	16.87	25.39	34.16	44.93	51.21^{a*}	4.97^{a*}	10.60	34.44	48.60^{a*}	1.10	2.75	21.59	27.79^{a*}
C1	2.50	2.80^{a*}	3.07	3.13	3.00	19.41^{a*}	27.74^{a**}	36.50	40.24	43.52	4.22	10.60	28.52	37.13	0.98^{a*}	2.82	16.35	21.34
C2	2.33	2.34^{b*}	2.71	3.03	3.00	13.72^{b*}	22.12^{b**}	30.62	39.36	44.28	1.46	7.46	25.63	38.67	0.22^{b*}	1.94	14.53	21.95
C1+B1	2.55	2.94	3.29	3.29	3.25	17.76	24.88	36.24	37.89	45.57	1.28	11.54	29.81	46.38	0.18^{a*}	3.01	16.64	26.24
C1+B2	2.15	2.56	3.00	2.96	2.50	20.71	27.84	36.56	37.40	36.14	4.69	12.57	17.38	27.55	1.21^{a*}	3.73	8.79	15.01
C1+B3	2.35	2.56	3.00	3.17	3.00	17.89	26.70	36.56	44.63	48.42	6.27	9.14	40.46	40.20	1.62^{a*}	2.24	23.50	22.40
C2+B1	2.25	2.50	2.88	3.17	3.25	13.63	21.45	31.51	38.23	43.20	0.70	2.39	19.59	36.24	0.07^{b*}	0.71	9.32	20.05
C2+B2	2.35	2.19	2.33	3.04	3.00	13.81	21.81	30.96	41.37	40.20	0.44	10.61	29.42	35.88	0.04^{b*}	2.89	16.29	22.37
C2+B3	2.20	2.50	2.92	2.88	2.75	15.85	24.09	31.76	45.23	54.00	3.66	12.05	28.42	57.00	0.59^{a*}	3.27	19.67	33.18
LSD C		0.43				1.31	1.93								0.66			
LSD B	0.44		0.78							9.28	3.96			9.51				3.92
LSD C×B													2.20×0.46					

Means values within a column followed by the different small letters are significant at *p<0.05 and **p<0.01

Table 3: Growth of fig on roots segment after receiving brassinolide

	Month after treatment																			
	Length (cm)				Fresh weight (g)				Dry weight (g)				Average diameter (mm)				Volume (cm^3)			
Treatments	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
B0	144.65	131.68^{b}	164.14	117.15^{b*}	0.72	0.75	7.76	6.45^{b*}	0.23	0.27^{b*}	4.54	4.52^{b*}	1.12	0.99^{b*}	4.81	2.95^{b*}	2.07	2.16^{b*}	31.37	15.34^{c*}
B1	75.68	213.04^{a*}	200.28	123.74^{b*}	0.07	2.31	6.27	7.45^{b*}	0.05	0.67^{ab*}	3.72	7.65^{a*}	0.74	1.11^{b*}	5.36	7.32^{a*}	0.32	5.79^{ab*}	34.89	40.92^{b*}
B2	159.21	275.28^{a*}	178.85	134.06^{b*}	0.67	4.80	7.16	10.22^{b*}	0.22	1.18^{a*}	4.47	4.62^{b*}	2.68	1.30^{b*}	4.00	10.09^{a*}	1.87	3.33^{ab*}	24.91	41.21^{b*}
B3	174.34	299.65^{a*}	206.53	203.97^{a*}	1.04	3.20	9.61	13.52^{a*}	0.31	0.93^{ab*}	6.76	6.85^{a*}	0.92	1.72^{a*}	3.55	7.15^{a*}	2.27	13.26^{a*}	28.44	46.99^{a*}
C1	193.44^{a*}	283.3	194.86	164.95	1.10^{a*}	3.41	7.37^{b*}	9.31	0.35^{a*}	0.90	4.70	6.07	1.11	1.32	4.74	5.46	2.75^{a*}	7.47	32.00	33.59
C2	83.50^{b*}	176.6	180.05	124.51	0.15^{b*}	2.12	8.03^{a*}	9.52	0.06^{b*}	0.62	5.05	5.76	1.62	1.24	4.12	8.30	0.51^{b*}	4.80	27.80	38.65
C1+B1	125.50	325.8	145.56^{a*}	119.86	0.12	4.38	6.75	14.95	0.08	1.08	4.11	8.60	0.73^{b*}	1.81	7.06	8.43	0.55	10.71	46.85	57.76
C1+B2	236.46	385.3	239.37^{a*}	156.31	1.30	7.10	5.15	7.30	0.42	1.71	3.64	4.83	1.29^{ab*}	1.53	2.87	5.23	3.50	13.17	15.32	28.70
C1+B3	224.16	244.8	255.01^{a*}	177.32	1.76	0.87	11.08	7.27	0.54	0.36	6.77	5.36	4.08^{a*}	0.93	4.54	4.73	3.67	2.43	33.99	27.59
C2+B1	25.85	100.3	212.19^{a*}	114.45	0.03	0.24	5.78	12.10	0.02	0.26	3.34	6.71	0.74^{a*}	0.79	3.65	6.22	0.09	0.87	22.94	36.22
C2+B2	81.95	214	118.34^{b*}	91.16	0.04	2.50	9.17	7.61	0.02	0.65	5.31	4.41	0.98^{ab*}	1.92	5.13	14.96	0.24	13.34	34.50	53.14
C2+B3	124.52	305.8	200.86^{ab*}	90.80	0.33	5.52	8.13	13.17	0.08	1.49	6.75	8.35	0.85^{a*}	1.29	2.56	9.57	0.87	4.22	22.89	54.83
LSD C	81.29				0.87		0.60		0.26								2.12			
LSD B		80.63		59.38				3.24		0.34		0.95		0.41		4.02		7.75		5.71
LSD C×B			162.57×110										0.58×5.39							

Means values within a column followed by the different small letters are significant at *p<0.05 and **p<0.01

Table 4: Pearson correlation between all measured parameters in the experiment

Parameters	NL	LFW	LDW	NS	SFW	RFW	SL	SDW	RDW	RL	RAD	RV
NL	1											
LFW	0.313*	1										
LDW	0.095	0.809**	1									
NS	0.318*	0.382**	0.704**	1								
SFW	0.020	0.603**	0.929**	0.791**	1							
RFW	0.020	0.628**	0.902**	0.756**	0.946**	1						
SL	0.192	0.548**	0.861**	0.848**	0.939**	0.870**	1					
SDW	-0.040	0.550**	0.911**	0.785**	0.992**	0.927**	0.919**	1				
RDW	-0.038	0.533**	0.890**	0.782**	0.967**	0.963**	0.888**	0.974**	1			
RL	0.553**	0.268	-0.079	-0.029	-0.147	-0.019	-0.002	-0.226	-0.164	1		
RAD	-0.194	0.421**	0.749**	0.655**	0.804**	0.728**	0.768**	0.818**	0.739**	-0.369**	1	
RV	-0.045	0.558**	0.891**	0.773**	0.937**	0.911**	0.878**	0.934**	0.910**	-0.220	0.905**	1

NL: Number of leaves, NS: Number of shoots, LFW: Leaves fresh weight, SFW: Shoots fresh weight, RFW : Roots fresh weight, SL: Shoots length, LDW: Leaves dry weight, SDW: Shoots dry weight, RDW: Roots dry weight, RL: Root length, RAD: Roots average diameter and RV: Roots volume * and **Significant at $p \leq 0.05$ and $p \leq 0.01$, respectively

cultivars and brassinolides. Most of the parameters Root Length (RL), Roots Fresh Weight (RFW), Roots Dry Weight (RDW), Roots Average Diameter (RAD) and Roots Volume (RV) were significant at second and fourth MAT. Treatment of the fig plants with different concentrations of brassinolide (B1, B2and B3) caused an increment in RL, RFW and RAD compared to control samples. On RDW and RV, increasing brassinolide concentration (B1 and B3) caused an increment in RDW and RV, but decreased when brassinolide concentration B2.

There was effect cultivar on growth of fig roots except on RAD. Interaction between brassinolide and fig varieties was significant on RL and RAD at third and first MAT, respectively. The highest RL and RAD values of interaction between brassinolide and fig variety were 255.01 cm and 4.08 mm on treatment of C1+B3 and the lowest RL and RAD values of interaction between brassinolide and fig variety were 118.34 cm and 0.74 mm on treatment of C2+B2 and C1+B1.

Correlation analysis: Correlation analysis was carried out to establish the relationship between the parameters. Table 4 shows that a significant positive inter-correlation among all parameters. Increasing in number of leaves, number of shoots, leaves fresh weight, shoots fresh weight, roots fresh weight, shoots length , leaves dry weight, shoots dry weight, roots dry weight, roots length, roots average diameter and roots volume were associated with an increment in number of leaves, number of shoots, leaves fresh weight, shoots fresh weight, roots fresh weight, shoots length, leaves dry weight, shoots dry weight, roots dry weight, roots length, roots average diameter and roots volume too. Significant negative correlation was noted only on between roots length with roots average diameter. Increasing in root length was associated with a decrement in root average diameter.

DISCUSSION

In this study, effect of brassinolide application exogenously on growth of fig on shoots, leaves and roots segments were investigated. The growth stimulation was more pronounces on above ground biomass than below ground biomass by having high shoots and leaves than roots. The increment in growth in this study, might be due to increased carboxylation rate after giving BL treatment which enhanced carbon assimilation that was channeled to increases in total biomass[22].

The BL induced synthesis of both indole-3-acetic acid (IAA) and gibberellic acid (GA) in plant and increased in SL, NS, SFW and SDW were probably due to their cumulative action[23]. Analysis of variance for plant showed a varying significant difference ($p<0.05$). As for the mean comparison between treatments, BL 200 mL L^{-1} showed the highest mean value, while the control application, without BL has the lowest mean value. This indicated that 100 ML L^{-1} BL significantly increased SL, NS, SFW and SDW compared to the control (without BL), while SL, NS, SFW and SDW of plant treated with 200 mL L^{-1} significantly increased compared to those in 100 mL L^{-1} BL.

The NL, LFW and LDW of fig significantly increased by increasing the concentration of BL up to 200 mL L^{-1}. Fig plants treated with 200 mL L^{-1} BL significantly increased NL, LFW and LDW compared to control. However, application with 200 mL L^{-1} BL gained the highest NL (10.13), LFW (7.77 g) and LDW (1.89 g) compared to other treatments. According to already published report[24], BL-treated plants resulted in higher LFW and LDW as well as leaf numbers of citrus plant under well-watered condition.

The RL, RFW, RDW, RAD and RV of fig significantly increased by increasing the concentration of BL up to

200 mL L^{-1}. Fig plants treated with 200 mL L^{-1} BL significantly increased RL, RFW, RDW, RAD and RV compared to control. However, application with 200 mL L^{-1} BL gained the highest RL (299.65 cm), RFW (13.52 g) and RV (46.99 cm^3), application with 50 mL L^{-1} BL gained the highest RDW (7.65 g) and application with 100 mL L^{-1} BL gained the highest RAD (10.09 mm) compared to other treatments. It was stated that under well watered and normal condition, the aerial part of a plant may increased in weight more than the roots[25]. The roots of a plant were able to supply water, nutrients and certain growth regulators to aerial part of plant.

The BL treatment has also been found to promote the occurrence of new roots and the formation of lateral roots of cucumber seedlings[26]. Analysis of variance showed there was significant difference ($p>0.05$) between the BL treated and control plants on the root part of fig after three months of planting at nursery (Table 3). The results showed that exogenous foliar sprayed on leaves of fig plants with different BL concentrations affected the root growth of RL, RFW, RDW, RAD and RV. However, the previous study showed that application of BL at 0.1, 1.0 and 10.0 µM promotes hypocotyl elongation of *Arabidopsis* in dark grown[27], although high concentrations of applied BL result in inhibition of root elongation[28].

The results of this study proved a close relationship between concentration of BL applied and the improvement of leaves, shoots and roots segment, thus it has been classified as a plant hormone that has a role in regulating the plant cell elongation of maize[29]. It was found that BL appeared to cause elongation by affecting wall extensibility and increasing wall relaxation properties in plant. Improvement in shoots by application of BL resulted in the increment of leafnumber[30]. Increasing leaf number concurrently enhanced total leaf area and thus allowed more light penetration into the canopy and has productive regions on the periphery of the canopy. Greater light interception instantly increased photosynthesis efficiency and improved plant growth performance of fig[1].

CONCLUSION

The presented results concluded that growth of fig was affected by brassinolide levels and cultivars. Application of 50-200 mL L^{-1} BL increased growth of fig on leaves, shoots and roots segment in 4 month observations. There was significant difference treatment of brassinolide and cultivar alone on growth of fig. In average, concentration of brassinolide at 200 mL L^{-1} resulted highest growth performance of fig. The highest growth value of interaction between brassinolide and fig variety was on treatment of IBT+200 mL L^{-1}. Between the varieties, IBT showed higher growth than MD. Significant negative correlation was noted only on between roots length with roots average diameter.

SIGNIFICANCE STATEMENTS

This study discovered the growth performance of fig after receiving brassinolide that can be beneficial for local farmers to use the brassinolide with concentration 200 mL L^{-1} and IBT variety to increase the productivity. This study will help the researchers to uncover the critical areas of brassinolide concentration and fig variety that many researchers were not able to explore.

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