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EFFECT OF TEMPERATURE, LEAF WETNESS PERIOD, LIGHT AND DARKNESS ON DEVELOPMENT OF BOTRYTIS BLIGHT (*BOTRYTIS GLADIOLORUM* TIMM.) OF GLADIOLUS (*GLADIOLUS GRANDIFLORUS* L.)

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ABSTRACT

Botrytis blight of gladiolus caused by *Botrytis gladiolorum* Timm. causes significant losses. It is favored by cool, wet and cloudy conditions. The weather parameters, especially temperature and leaf wetness period, play a pivotal role in epidemic development of any disease. The effect of these parameters on disease development was investigated under artificial conditions of disease development. Sixty-day old plants of gladiolus, cv. Sancerre, grown in 6 inch diameter plastic pots, were artificially inoculated with spore suspension of the fungus *B. gladiolorum* standardized at 4 X 10^4 conidia/ml of water. The inoculated plants were incubated in growth chambers, maintained at 10, 15, 20, 25 and 30±1^{0}C. Leaf wetness durations of 3, 6, 12, 24, 48 and 96 h were provided in each of the temperature regimes. It was recorded that the optimum temperature for disease development was 20±1^{0}C, followed by 15 and 10^0 C. Furthermore, the disease severity increased with increasing leaf wetness periods, being the maximum at 96 h. To simulate cloudy conditions, the effect of light and darkness on disease development was studied separately in pot and field trials. Different combinations of light (L) and dark (D) periods (h) were provided, which were as follows: 12L+12D, 9L+15D, 6L+18D, 3L+18 D and 0L+24D. The plants were inoculated as described in the above experiment and incubated at 20±1^{0}C in the pot trial, whereas at ambient temperature conditions in the field trial. It was found that disease severity increased with increasing periods of darkness (h), being the maximum at a combination of 0L + 24D.

KEYWORDS: Gladiolus, Botrytis, Effect of Weather Parameters on Disease

INTRODUCTION

Gladiolus (*Gladiolus grandiflorus* L.) is a popular, bulbous flowering plant having long majestic spikes. Diseases are a major constraint in profitable cultivation of this flower crop. Botrytis blight caused by *Botrytis gladiolorum* Timm. is an economically important disease that plays havoc with the crop under north Indian conditions. The symptoms of this disease appear on leaves, flowers, stems and corms. It causes large oval to round brown spots on leaves and water-soaked spots on flower petals. Incipient floral infections cause flowers to rot during transit to market, reducing its market value (Magie, 1956). The fungus causes basal stem infections (neck rot) which may penetrate to the corm. Corm rotting may continue in cold storage conditions. It is difficult to control the disease once it appears in the field (Singh *et al.*, 2005).

The weather parameters play a key role in the development of Botrytis blight. The effect of temperature and leaf wetness period has not been precisely worked out in *Botrytis gladiolorum* of gladiolus. Light has been reported to have variable effects on growth processes of fungi, but the effect of light and darkness period on the growth and sporulation of *B. gladiolorum* is also less well studied. In view of these knowledge gaps, effects of temperature, leaf wetness period and light/darkness have been determined on development of the disease in the present studies.

MATERIALS AND METHODS

Leaf samples of gladiolus variety 'White Prosperity' infected with *Botrytis gladiolorum* were collected from experimental area of Department of Floriculture and Landscaping, Punjab Agricultural University, Ludhiana. Small bits of infected leaves were surface-sterilized with 1:1000 mercuric chloride, given three washings in sterile distilled water and placed aseptically on Potato Dextrose Agar (PDA) medium at 20 ± 1^0C in a B.O.D. incubator. The fungus was purified using a single spore technique. The monoconidial culture of the fungus was multiplied on PDA medium for preparation of inoculum.

The corms of gladiolus variety 'Sancerre' were planted in 6 inch diameter plastics pots in pot house the month of November. The number of corms planted per pot was three. The recommended packages of practices for cultivation were followed (Kumar and Sidhu, 2011). The sixty-day old plants were artificially inoculated with spore suspension of the fungus *B. gladiolorum* standardized at 4 $x10^4$ conidia/ml of water and placed in growth chambers provided in the departments of Floriculture and Landscaping, Plant Pathology, and Processing and Food Engineering, P.A.U, Ludhiana. The conidial suspension was prepared in sterilized distilled water and spore concentration adjusted using Neubauer Hemacytometer. Immediately after inoculation the plants were incubated at different temperature regimes, i.e. 10, 15, 20, 25 and 30 ± 1^0C. The plants at each of the temperature regimes were provided leaf wetness periods of 3, 6, 12, 24, 48 and 96 h duration. The leaf wetness was created using humidifiers. After the required wetness period the plants were maintained at the above mentioned temperatures at prevailing humidity levels. Light intensity of 500 Lux, obtained from a white fluorescent and incandescent light source, in a ratio of 2:1, was made available to the plants in on a 12 h day and night cycle. Three replications were kept for each treatment.

The effect of light and darkness on disease development was studied in pot and field trials. The plants were kept under different combinations of light (L) and dark (D) periods (h) as follows: 12L+12D, 9L+15D, 6L+18D, 3L+21D, 0L+24D. The supplemental light, where required, was provided at intensity of 500 Lux as mentioned in the above experiment; whereas the darkness by covering plants with a black cloth sheet. Four replications were maintained for each treatment. The plants grown in 6 inch diameter plastic pots were inoculated as described in the above experiment and incubated at 20 ± 1^0C in the growth chambers; whereas the plants grown in the field at a spacing of 20 x 25 cm in 1 sq. m beds were inoculated and maintained at ambient temperature conditions. High humidity was maintained by occasional spraying of water in both the cases. Water was atomized on the plants through a slip pocket created on the inner side of the cloth cover that was used to provide dark conditions to plants.

The data on incubation period, latent period and severity of the disease were recorded at appropriate periods. The incubation period was regarded as the period between inoculation and appearance of symptoms of disease. The latent period was regarded as the period from symptom appearance to the sporulation of the pathogen. Data on severity of the disease were recorded after 4 and 8 days of inoculation, on a 0 - 4 rating scale as given below:

Grade/Category		**Extent of Infection**
0	=	No infection
1	=	1-25 per cent of the leaf area infected
2	=	25-50 per cent of the leaf area infected

3 = 50-75 per cent of the leaf area infected

4 = More than 75 per cent of the leaf area infected

The per cent disease severity or intensity (PDI) was computed using the following formula:

$$\text{Disease severity (\%)} = \frac{\text{Sum of all numerical ratings}}{\text{Total number of ratings}} \times \frac{100}{\text{Maximum rating}}$$

All statistical analyses were performed using Statistical Package for Social Science (SPSS 16). The factorial two way analysis of variance (ANOVA) was carried out in the pot and field trials. The Least significant difference (LSD) is calculated by using the following formula:

$$LSD = \text{Table (F-value)} \times \sqrt{MSE/N}$$

Where, MSE = Mean error sum of square

N= Average number of sample size

Table F-value = The value of F-distribution at 5 % level of significance.

RESULTS AND DISCUSSIONS

Effect of Temperature and Leaf Wetness Period

Data on influence of temperature and leaf wetness period on incubation period of *Botrytis gladiolorum* are given in Table 1. It was found that temperature of 20±1^{0}C and leaf wetness periods of 24, 48 and 96 h were the most suitable for disease development. The symptoms appeared in the form of minute water-soaked spots in 2 days time at these combinations. An incubation period of 3 days was recorded when leaf wetness periods of 3, 6 or 12 h were provided at this temperature. Temperature of 15±1^{0}C and leaf wetness periods of 48 and 96 h were the next most ideal combinations for disease development, as the symptoms expressed in 2 days time at this combination also. An incubation period of three days was recorded at 12 and 24 hrs of leaf wetness periods at this temperature. The same length of incubation period, i.e. 3 days, was observed at temperatures of 10, 25 and 30±1^{0}C, and 24, 48 and 96 hrs of leaf wetness period, giving the impression that temperature of 10, 25 and 30±1^{0}C equally favour the disease. On closer scrutiny of the data, it was, however, found that temperature of 25±1^{0}C was better than that of 10 and 30±1^{0}C as the disease symptoms manifested in 4 days time at this temperature, whereas 5 days were required for symptoms to appear at 10 and 30±1^{0}C. On the whole, the disease was favoured the most at 20±1^{0}C followed by 15, 25, and 10 (or 30±1)^{0}C, and similarly cumulative indices of incubation period, worked out by adding incubation periods corresponding to 3, 6, 12, 24, 48 and 96 h wetness durations, were 15, 18, 21, 22 and 22 days, respectively. Sporulation of the fungus *B. gladiolorum* under different temperature and leaf wetness periods was found to be very sparce under artificial conditions of disease development. The differences in extent of sporulation were hardly perceptible as a result of which a visual grading scale could not be devised, and hence latent period could not be mentioned.

Effect of temperature and leaf wetness duration on severity of Botrytis blight has been shown in Table 2 and 3. It was observed that after 4 days of inoculation, maximum severity of disease (75.00%) was recorded at 20±1^{0}C, followed by that at 15±1^{0}C (66.75%), 10±1^{0}C (50.00%), 25±1^{0}C (41.75%) and 30±1^{0}C (25.00%) at 96 h of leaf wetness

period. Almost a similar but decreasing trend of disease severity was observed at 48, 24, 12, 6 and 3 h of leaf wetness durations. After 8 days of inoculation period disease severity was found to be the maximum (100.00%) at 20±1^{0}C at leaf wetness period of 96 h and the minimum (8.25%) at 10, 25 and 30±1^{0}C at 3hrs of leaf wetness period. On the whole, the disease severity was more after 8 days of incubation as compared to that after 4 days. A three-dimensional view of a bar diagram showing influence of temperature and leaf wetness periods on disease severity has been depicted in Figure 1 and 2.

The optimum temperature was found to be 20±1^{0}C in the present studies. Several workers have reported minimum, optimum and maximum temperature for infection, germination, growth and sporulation of *Botrytis* spp. Their results are broadly in agreement with findings of the present study, but are to some extent at variance also. The optimum temperature has been reported to be 20^{0}C for *B. alii* infection in onion (Bertolini and Tian, 1997) and *B. cinerea* germination in chickpea crop (Rewal and Grewal, 1989). The optimum temperature ranges for infection by *B. gladiolorum* have been reported to be 20-22.5^{0}C (Timmermans, 1941) and 18.3-23.8^{0}C (McClellan *et al.*. 1949). Sosa-Alvarez *et al.* (1995) reported temperature of 17-18^{0}C to be optimum for *B. cinerea* in strawberry. Nair and Allen (1993) found that temperature of 23.7 and 20.8^{0}C was optimum for flower and berry infection, respectively, in grapes. Bakr *et al.* (1993) recorded high incidence of *B. cinerea* between 17-28^{0}C in chickpea. Tripathi and Rathi (1992) reported maximum severity of Botrytis blight of chickpea at a temperature of 25-30$^{0.}$C. However, 30^{0}C has been reported to be the maximum temperature for *B. gladiolorum* (Timmermans, 1941). The minimum temperature has been reported to be between 3-5^{0}C for several *Botrytis* spp. (Timmermans, 1941; Rewal and Grewal, 1989; Gubler *et al.*, 1996). In the present study effect of temperature as low as 3-5^{0}C was not investigated, as mercury normally does not dip so low during the severe winter months under Punjab conditions, and moreover, because infection by the fungus gets arrested even at 10^{0}C as shown by the data.

Johar *et al*. (1998) reported that level of infection of chickpea by *Ascochyta rabiei* increased with increasing leaf wetness period exponentially from 4-18 hrs. Singh and Kapoor (1984) reported that leaf wetness period of more than 12hrs was required for infection of chickpea by Botrytis grey mould fungus, with complete mortality of plants occurring at 144 hrs of leaf wetness duration. Sosa-Alvarez *et al.* (1995) reported that leaf wetness period of 3-11 days was required for sporulation of the *Botrytis cinerea* at optimum temperature (17-18 ºC) in strawberry crop. Gubler *et al*. (1996) mentioned that 15 hours or more of the leaf wetness period may be required for Botrytis fruit rot of Strawberry at extreme temperatures below 4.4^{0}C and above 32.2^{0}C. Nair and Allen (1993) reported that leaf wetness period of 1.3 hrs was required of flower infection, whereas 13.9 hrs for fruit infection in grapes by *B. cinerea*, indicating that leaf wetness period may vary with the type of tissue involved.

Effect of Light and Darkness Period

The effect of light and darkness on the development of Botrytis blight of gladiolus was studied both in pot and field trials (Table 4 and 5). In the *pot trial* conducted in the growth chambers, the minimum incubation period of 2 days was recorded in 0L+24D, 3L+21D, 6L+18D and 9L+15D, while 3 days in 12L+12D treatment. The symptoms mostly developed in the form of grayish-white lesions with or without a water-soaked appearance. The disease severity was maximum (62.50 and 100.00%) in 0L+ 24D after 4 and 8 days of inoculation: whereas minimum (25.00 and 62.50%) in 12L+ 12D after 4 and 8 days of inoculation, respectively.

In the *field trial*, the disease symptoms were observed after 2 days of incubation period in 0L+ 24D and 3L+21D treatments, whereas 3 days of incubation period was found in 6L+18D, 9L+15D and 12L+12D combinations of light and darkness periods. Symptoms appeared in the form of oval to circular water-soaked lesions that enlarged and developed brown or grayish-brown colour in their centre. As regards the latent period, the minimum latent period of 8 days was observed in 12L+12D followed by 9 days in 9L+15D, 10 days in 6L+18D and 3L+21D and 11 days of latent period in 0L + 24D. The disease severity was observed after 4 and 8 days of inoculations and it was found that the maximum disease severity (56.25%) was in 0L+24D followed by 43.75% in 3L+21D, 37.50% in 6L+18D, 31.25% in 9L+15D and 25.00% in 12L+12D after 4 days of inoculation. The similar trend was also observed after 8 days of inoculation as 81.25% was maximum which was in 0L+ 24D and minimum disease severity (50.00%) was in combination of 12L+12D periods.

The results of the study have shown that disease severity increased on decreasing exposure to light hours, i.e. continuous dark period resulted in significantly more disease than 12L+12D treatment. It may be inferred from the study that the plants get predisposed to infection by the fungus under dark conditions. The observations made by Singh and Kapoor (1984) also support our findings who found that the disease severity was more when the range of dark period varied from 4 to 12 h in grey mold of chickpea. Jhorar *et al*. (1998) also found that the disease severity increased with increasing periods of darkness after inoculation with *Didymella rabiei* in chickpea.

The effect of light on sporulation of *Botrytis* spp. has been reported to be variable. In the present studies sporulation was found to be scanty under prolonged dark conditions and moreover the latent periods longer under these conditions. Sporulation was better under 12 h day and night cycle. Harada *et al*. (1972) also found that a 12 h dark cycle or continuous light stimulated sporulation in *Botrytis cinerea*. However, Beck and Vaughan (1949) found that *B. cinerea* infecting Saintpaulia sporulated profusely in conditions of low light intensity. Stewart and Long (1987) found that sporulation behavior of *Botrytis cinerea* varied among different isolates and out of 43 isolates 12 isolates showed no sporulation in darkness. Zhang and Sutton (1994) reported that light and darkness did not significantly affect sporulation of *B. cinerea* of black spruce under different wetness periods.

The weather parameters, viz. temperature and leaf wetness period, have normally been used for development of forecasting models in plant diseases (Nair and Allen, 1993; Broome *et al.*, 1995). The results of the present study undertaken on development of Botrytis blight may also have relevance in a disease prediction model. Long-term prediction of the disease, however, may only be possible after study of influence of host, pathogen and environmental factors on survival of the fungus and transmission of disease in relation to time. The result of the present study could, however, be of help in predicting epidemic build-up of disease on a short term basis under our agro-climatic conditions.

CONCLUSIONS

It is evident from the findings that a temperature of 20 ± 1^{0}C was the most favorable for development of Botrytis blight of gladiolus. Longer leaf wetness periods favored disease more than shorter leaf wetness periods. Prolonged periods of darkness also resulted in faster development of the disease. Under such conducive environmental conditions the disease causes extensive loss to gladiolus.

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REFERENCES

1. Bakr, M. A., Rehman, M. M., Ahmed, F. and Kumar, J. (1993). Progress in the management of botrytis gray mold of chickpea in Bangladesh: In: Haware, M.P., Gowda, C.L.L. and McDonald, D. (Eds.) Recent advances in research on botrytis gray mold of chickpea (1993): Summary Proceedings of the Second Working Group Meeting to Discuss Collaborative Research on Botrytis Gray Mold of Chickpea, 14-17 Mar 1993, Rampur, Nepal. International Crops Research Institute for the Semi-Arid Tropics. Patancheru 502324, Andhra Pradesh, India: pp.17-19.
2. Beck, G.E., and Vaughan, J.R. (1949). Botrytis leaf and blossom blight of Saintpaulia. *Phytopathology*, 39: 1054-1056.
3. Bertolini, P. and Tian, S.P. (1997). Effect of temperature of Production of *Botrytis allii* conidia on their pathogenicity to harvested white onion bulbs. *Plant Pathol.*, 46:432-438.
4. Broome, J.C., English, J.T., Marois, J.J., Latorre, B.A. and Aviles, J.C. (1995). Development of an infection model for Botrytis bunch rot of grapes based on wetness duration and temperature. *Phytopathology*, 85:92-102.
5. Gubler, D., Welch, N. and Westerlund, F. (1996). Botrytis Fruit Rot of Strawberry. http://www.calstrawberry.com/research_library/96-06.pdf
6. Harada, Y., Takashima, M., Fujita, T. and Terui, M. (1972). Cultural study of the gray mold fungus *Botrytis cinerea*. *Bull. Fac. Agric. Herosaki Univ.*, 19:22-31.
7. Jhorar, O., Butler, D. and Mathauda, S. (1998). Effects of leaf wetness duration, relative humidity, light and dark on infection and sporulation by *Didymella rabiei* on chickpea. *Plant Pathol.*, 47:586-594.
8. Kumar, R. and Sidhu, G.S. (2011).”Flower cultivation and Landscaping”. Punjab Agricultural University. pp 72.
9. Magie, R.O. (1956). Gladiolus Botrytis control. *Proc. Fla. State Hort. Soc*., 69:337-343.
10. McClellan W. D, Baker, K. F., and Gould, C. J. (1949). Occurrence of Botrytis disease of Gladiolus in the United States in relation to temperature and humidity. *Phytopathology* 39:260-271.
11. Nair, N.G. and Allen, R.N. (1993). Infection of grape flowers and berries by *Botrytis cinerea* as a function of time and temperature. *Mycol. Res*., 97:1012-1014.
12. Rewal, N, and Grewal, J.S. (1989). Effect of temperature, light and relative humidity on conidial germination of three strains of *Botrytis cinerea* infecting chickpea. *Indian Phytopathol.*, 42:79-83.
13. Singh, G. and Kapoor, S. (1984). Role of incubation and photoperiod on the intensity of botrytis gray mold of chickpea. *Internl Chickpea Newsl.*, 12:23-24.
14. Singh, P.J., Sidhu, G.S. and Kumar, Ramesh (2005). Effect of pre- and post-inoculative sprays of fungicides on blight of gladiolus caused by *Botrytis gladiolorum*. *J. Orn. Hor.*, 8 (2): 137-139.

15. Sosa-Alvarez, M., Madden, L.V and Ellis, M.A. (1995). Effects of temperature and wetness duration on sporulation of *Botrytis cinerea* on strawberry leaf residues. *Plant Dis.*, 79: 609-615.
16. Stewart, T.M. and Long, P.G. (1987). Sporulation of *Botrytis cinerea* in the dark. *New Zeal J. Exp. Agr*. 15: 389-392.
17. Timmermans, A.S. (1941).The Botrytis rot of Gladiolus caused by *Botrytis gladiolorum*. *Meded. Lab. Bloembollenonderz.* Lisse, 67: 32.
18. Tripathi, H.S. and Rathi, Y.P.S. (1992). Epidemiology of botrytis gray mold of chickpea. In: Haware, M.P., Faris, D.G., Gowda, C.L.L., (Eds.) Botrytis gray mold of chickpea (1992): International Crops Research Institute for the Semi-Arid Tropics. Patancheru 502 324, Andhra Pradesh, India. pp. 8-9.
19. Zhang, P.G. and Sutton, J.C. (1994). Effects of wetness duration, temperature, and light on infection of black spruce seedlings by *Botrytis cinerea. Can. J. For. Res.* 24(4): 707-713

APPENDICES

Table 1: Effect of Temperature and Leaf Wetness on Incubation Period of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum* (Pooled Analysis 2011-12, 2012-13)

Temperature (±1^{0}C)	Incubation Period (Days) at Different Leaf Wetness Periods hr(s)					
	3	6	12	24	48	96
10	5.00	4.00	4.00	3.00	3.00	3.00
15	4.00	4.00	3.00	3.00	2.00	2.00
20	3.00	3.00	3.00	2.00	2.00	2.00
25	4.00	4.00	4.00	3.00	3.00	3.00
30	5.00	4.00	4.00	3.00	3.00	3.00
LSD(P<0.001)	Leaf wetness period (A) = 0.08, Temperature (B) = 0.07, A x B = 0.05					

Table 2: Effect of Temperature and Leaf Wetness on Severity of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum* after 4 Days of Inoculation (Pooled Analysis 2011-12, 2012-13)

Temperature (±1^{0}C)	Disease Severity (%) at Different Leaf Wetness Periods hr(s)					
	3	6	12	24	48	96
10	0.00	8.25	16.75	25.00	33.25	50.00
15	8.25	16.75	25.00	25.00	41.75	66.75
20	8.25	25.00	33.25	41.75	50.00	75.00
25	0.00	8.25	16.75	25.00	33.25	41.75
30	0.00	8.25	8.25	16.75	16.75	25.00
LSD(P<0.001)	Leaf wetness period (A) = 0.18, Temperature (B) = 0.17, A x B = 0.15					

Table 3: Effect of Temperatures and Leaf Wetness on Development of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum* after 8 Days of Inoculation (Pooled Analysis 2011-12, 2012-13)

Temperature (±1^{0}C)	Disease Severity (%) at Different Leaf Wetness Periods (hrs)					
	3	6	12	24	48	96
10	8.25	16.75	25.00	33.25	58.25	75.00
15	16.75	25.00	33.25	41.75	66.75	83.25
20	16.75	33.25	41.75	66.75	83.25	100.00
25	8.25	16.75	33.25	41.75	50.00	66.75
30	8.25	16.75	25.00	33.25	41.75	50.00
LSD(P<0.001)	Leaf wetness period (A) = 0.19, Temperature (B) = 0.19, A x B = 0.11					

Table 4: Effect of Light and Darkness Periods on Disease Development of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum* under Growth Room/Chamber Conditions (Pooled Analysis 2011-12, 2012-13)

Light and Darkness Period	Incubation Period (Days)	Disease Severity (after 4 Days)	Disease Severity(after 8 Days)
0L+ 24D	2.00	62.50	100.00
3L+21D	2.00	50.00	81.25
6L+18D	2.00	43.75	75.00
9L+15D	2.00	37.50	68.75
12L+12D	3.00	25.00	62.50
LSD(P<0.001)	NS	Disease severity (A) = 0.21, Light and Darkness period (B) = 0.24, A x B = NS	

Table 5: Effect of Light and Darkness Periods on Disease Parameters of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum* under Field Conditions (Pooled Analysis 2011-12, 2012-13)

Light and Darkness Periods	Incubation Period (Days)	Latent Period (Days)	Disease Severity (after 4 Days)	Disease Severity (after 8 Days)
0L+ 24D	2.00	11.00	56.25	81.25
3L+21D	2.00	10.00	43.75	75.00
6L+18D	3.00	10.00	37.50	62.50
9L+15D	3.00	9.00	31.25	56.25
12L+12D	3.00	8.00	25.00	50.00
LSD(P<0.001)	0.51	0.88	Disease severity (A) = 0.33, Light and Darkness period (B) = 0.38, A x B = NS	

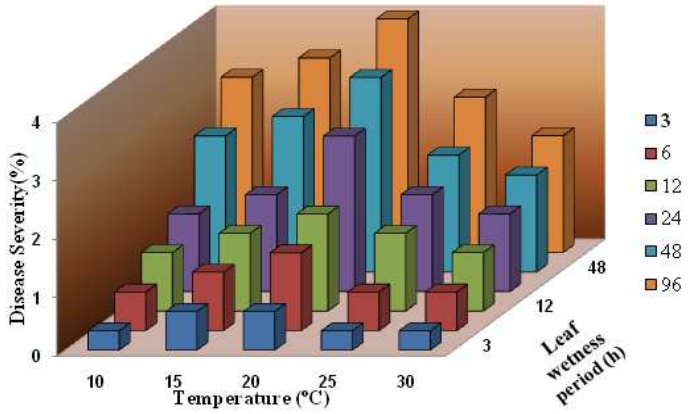

Figure 1: Development of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum*, at Different Temperatures and Leaf Wetness Durations (after 4 Days)

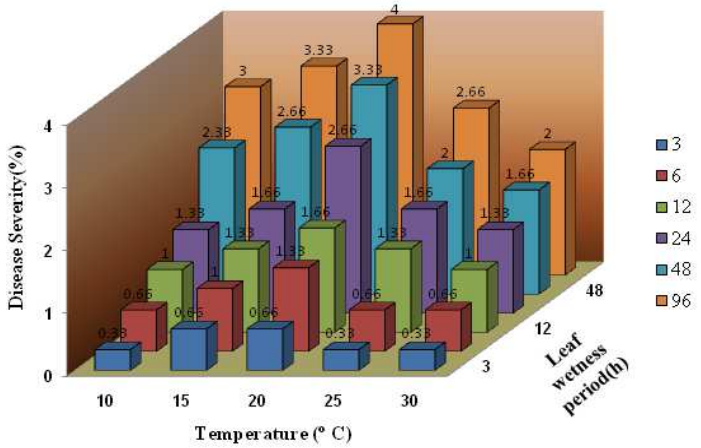

Figure 2: Development of Botrytis Blight of Gladiolus Caused by *Botrytis gladiolorum*, at Different Temperatures and Leaf Wetness Durations (after 8 Days)