

Banana susceptibility to wound anthracnose: effects of flooding, early-harvesting, and source-sink ratio modification



WOUND anthracnose, caused by the fungus *Colletotrichum musae*, has a major impact on the quality of export bananas worldwide. Fruits harvested at an advanced physiological age seem to be more susceptible to anthracnose. We examined the relationship between the fruit physiological age, measured by the temperature sum (in degree days – dd), and the susceptibility to wound anthracnose by analysing the effects of three factors:

- Flooding—a stressful growing condition—in a greenhouse
- Early harvesting of bananas under two climatic conditions
- Source-sink ratio modification by removal of leaves or hands



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Flooding at the flowering or vegetative stage

Conditions

- Greenhouse experiment in Guadeloupe
- Fruits harvested at 900 dd

Results

- Significant negative effect on fruit morphology (Figure 1)
- No detectable effect on fruit susceptibility to *C. musae* and green life (Figure 2).

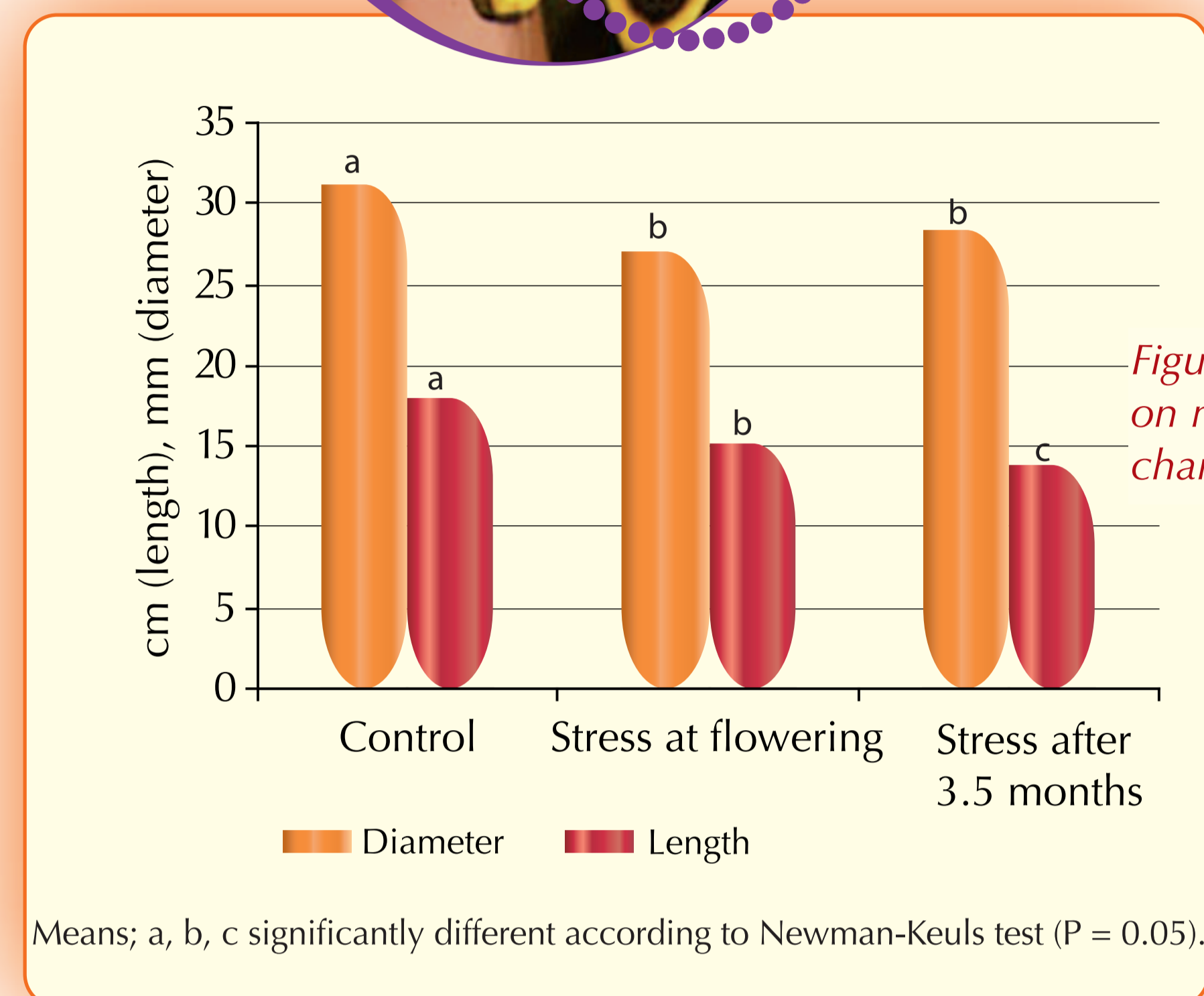


Figure 1: Effect of flooding on morphological characteristics of bananas.

Early harvesting at 700 dd

Conditions

- Experiment conducted on two plots in Guadeloupe highlands (700 m elevation) and lowlands (50 m elevation)
- Fruits harvest at 700 dd (early harvesting) and 900 dd (control)

Results

- In both lowland and highland zones, decrease in susceptibility of bananas to *C. musae* and increase in green life (Figure 3)
- Concomitant decrease in fruit diameter in both zones (Figure 4)
- Concomitant decrease in finger length in the lowland zone only (Figure 4).

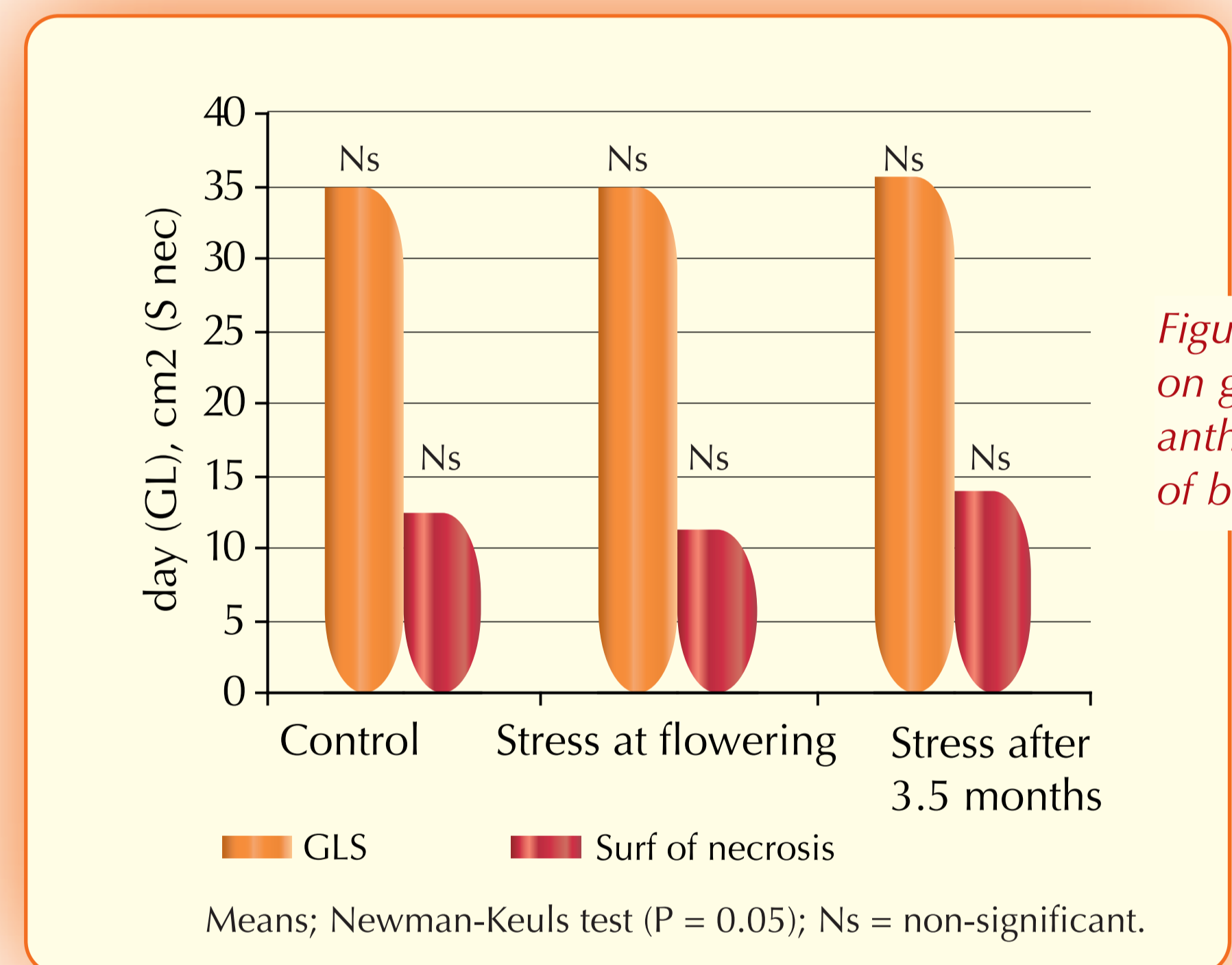


Figure 2: Effect of flooding on green life (GL) and anthracnose susceptibility of bananas

Source-sink ratio modification

Conditions

- The three previous experiments: greenhouse, lowland and highland plots

Results

- When harvesting at a constant fruit diameter (34 mm), highly significant effect on fruit susceptibility to *C. musae* and on the green life (Table)
- When harvesting at 900 dd irrespective of the diameter, no significant differences with respect to rotted area and green life.

Treatment	Harvest criteria	Physiological age (degree days)	Fruit diameter (mm)	Finger length (cm)	Green life (days)	Rotted area (mm ²)
Fruit Removal	Physiological age	898	39.8 a	20.1 a	25.7 b	1245.3 b
	Fruit diameter	746	34.9 b	18.8 b	37.3 a	692.7 c
Defoliation	Physiological age	898	31.1 c	14.6 d	22.7 b	1557.3 b
	Fruit diameter	1066	34.0 b	15.7 cd	12.7 c	2057.0 a
Control	Physiological age	898	34.9 b	17.3 c	25.6 b	1285.6 b
	Fruit diameter	887	34.5 b	17.0 c	24.0 b	1313.0 b

Mean data; a, b, c, d significantly different according to Newman-Keuls test (P = 0.05). Data presented are pooled from three experiments after variance homogeneity test.

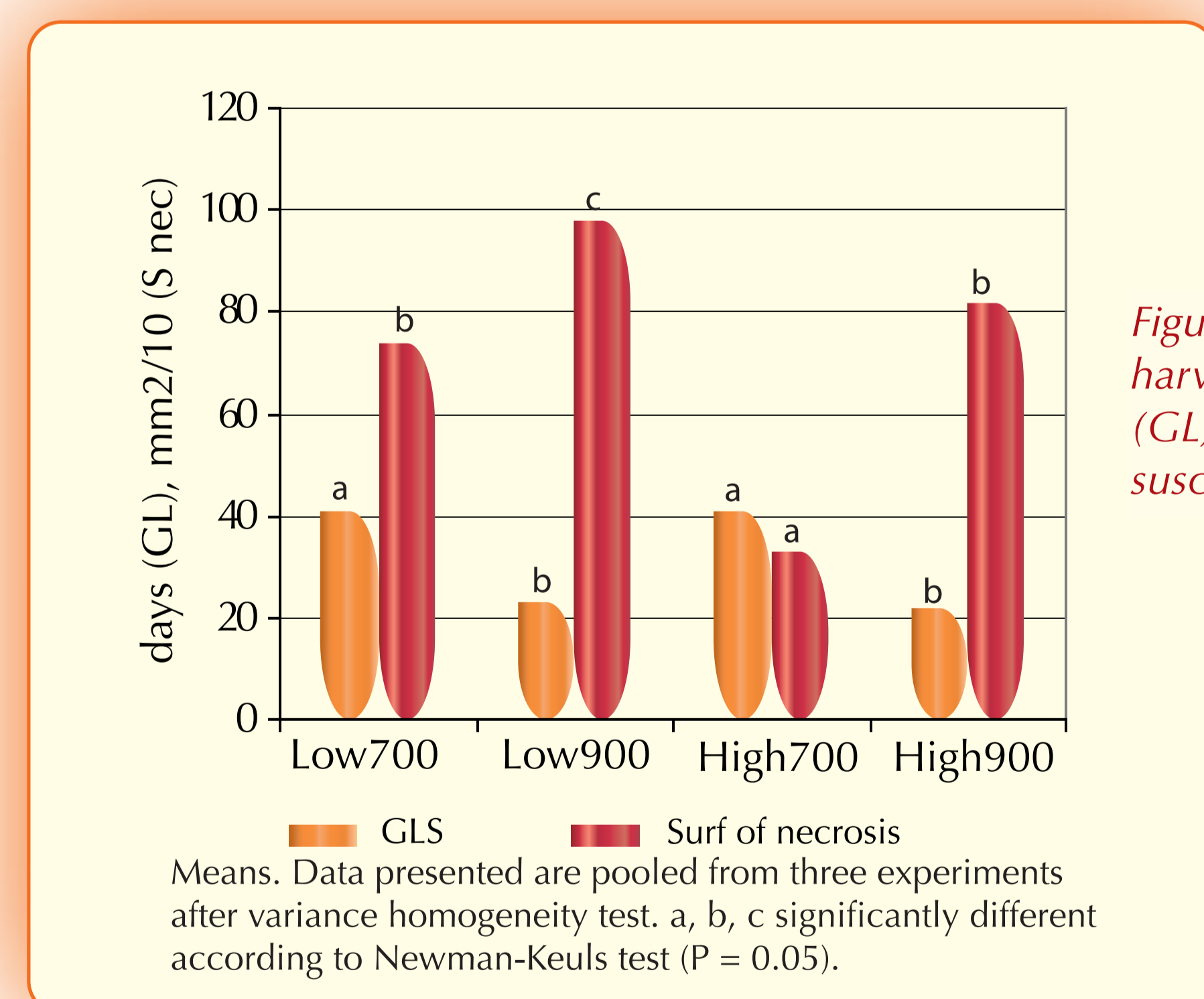


Figure 3: Effects of early-harvesting on green life (GL) and anthracnose susceptibility of bananas.

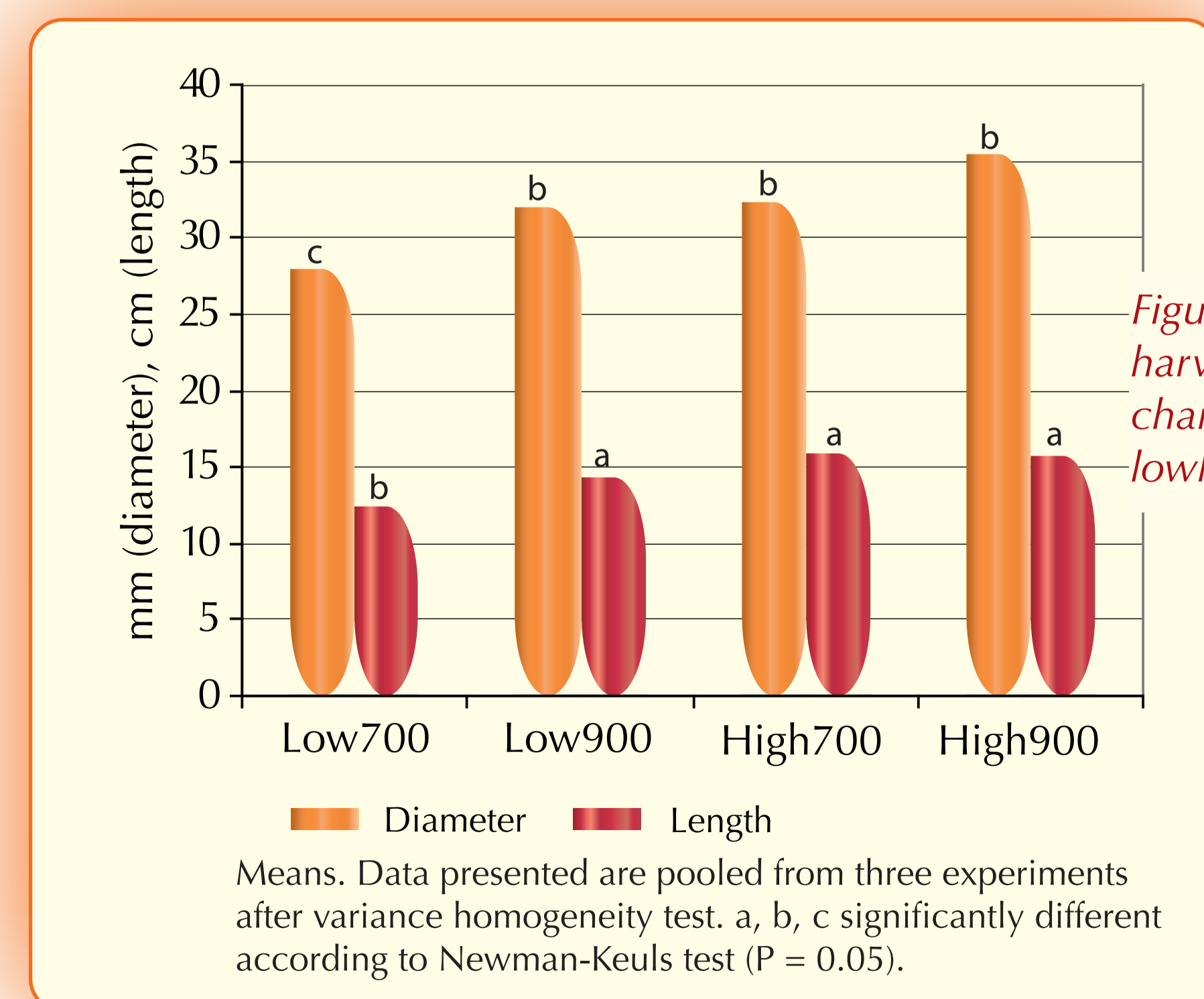


Figure 4: Effects of early-harvesting on morphological characteristics of bananas in lowland and highland zones.

Conclusion

These results suggest that the susceptibility of bananas to wound anthracnose is closely linked with their physiological age based on temperature sums.