

# Influence of *Bacillus subtilis* FZB24 on the growth and development of tomatoes during summer in the arid tropics



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## 1. Introduction

In the Sudan, tomato (*Lycopersicon esculentum* Mill.) is grown as an irrigated winter crop. It is an important component of the daily diet, used in fresh and dry form for food preparations. High temperature is a major environmental abiotic stress that limits tomato production during summer season in the arid tropics of the Sudan (Tab. 1). Positive effects of *Bacillus subtilis* FZB24 on plant growth and development have been reported previously inducing resistance to diseases by activation of defence genes in plants and promoting plant and root growth. Its could be suggested that *Bacillus subtilis* FZB24 can stimulate the growth of tomato plants under field conditions during summer in the arid tropics of the Sudan.

Tab. 1: Mean monthly temperature(°C) and relative humidity (RH%) during the experiment period.

Month	Temperature °C		Relative humidity (RH%)
	Maximum	Minimum	
March	37.2	18.1	23
April	40.9	21.0	16
May	44.0	23.8	19
June	41.3	26.1	28

Source: Shambat Meterological Station (Khartoum) Sudan

The objective of this study is to investigate the effect of *Bacillus subtilis* FZB24<sup>®</sup>TB on the growth and development of tomatoes during summer in the arid tropics of the Sudan.

## 2. Material and Methods

The heat tolerant cultivar 'Summer set' and the heat sensitive cultivar 'Peto 86' were selected for this experiment. The two cultivars were planted in plastic pots with substrate (clay:sand, 2:1), later on were divided into two sets. One set was treated with *Bacillus subtilis* FZB24 at the rate of 250 g m<sup>-3</sup> substrate, the other one was left as control (without treatment). The tomato plants were grown at the Khartoum University Farm in Shambat, Sudan (Latitude 15° 40' N and Longitude 32° 32') in a randomized block design with three replications. Irrigation was conducted every 5 days. Fertiliser were added to the soil at rate of 80 kg ha<sup>-1</sup> twice as urea, three week after sowing and at flowering. The following characteristics were recorded: plant height; leaf area; fresh and dry weight of leaves, stem, roots and fruits; number of clusters; number of flowers; number of pollen grains per microscopic field.

## 3. Results

Differences were detected among the treatments and cultivars for some parameters. Heat tolerant cultivar 'Summer set' showed higher vegetative growth than the heat sensitive one 'Peto 86'. *Bacillus subtilis* FZB24 stimulate the vegetative growth for both cultivars, but have no positive effects on tomato fruit set. The shoot dry weight of the plants treated with *Bacillus subtilis* FZB24 were higher than that not treated in both cultivars ( Fig.1, Tab.2 ).

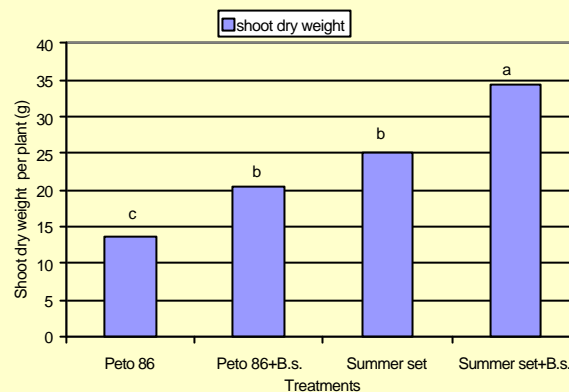


Fig. 1: The effect of *Bacillus subtilis* FZB24 on the shoot dry weight per plant of two tomato cultivars during summer in the arid tropics conditions of the Sudan . Differences between bars labelled by the same letters are not significant (P<0.05)

Tab. 2: The effect of *Bacillus subtilis* FZB24 on some plant parameters of two tomato cultivars during summer in the arid tropics conditions of the Sudan .

Treatments	Leaf fw (g plant <sup>-1</sup> )	Leaf dw (g plant <sup>-1</sup> )	Stem fw (g plant <sup>-1</sup> )	Stem dw (g plant <sup>-1</sup> )	Leaf area (cm <sup>2</sup> )
Peto 86	23.89 c	8.52 c	18.02 c	5.23 c	573.73 c
Peto 86 + B.s.	27.63 c	11.46 bc	24.24 c	9.00 b	923.56 c
Summer set	62.68 b	13.86 b	59.67 b	11.27 b	1699.45 b
Summer set + B.s.	86.24 a	19.51 a	79.72 a	14.94 a	2323.28 a

Differences between bars labelled by the same letters are not significant (P<0.05). fw = fresh weight, dw = dry weight.

## 4. Discussion & Conclusion

This experiment indicate that *Bacillus subtilis* FZB24 may promote and hastening the growth of tomato plants at the vegetative growth stages during summer under arid tropic conditions.

Significant differences in some parameters were found among the treatments and cultivars.

Further experiments are needed to investigate the role of *Bacillus subtilis* FZB24 on the growth and development of tomatoes under heat stress conditions.