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NOTE

Bacterial leaf and stem blight of safflower in Pakistan

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SUMMARY

Bacterial leaf and stem blight disease on safflower (*Carthamus tinctorius* L.) was detected in 1985 at National Agricultural Research Centre, Islamabad. The causal agent isolated from diseased plants was a rodshaped, gram-negative, motile fluorescent bacterium which was on the basis of its bio-chemical and physiological reactions, identified as *Pseudomonas syringae* pv. *syringae* van Hall. This is believed to be the first identification of this bacterium on safflower from Pakistan.

Additional key words : *Pseudomonas syringae*.

RÉSUMÉ

Dessèchement bactérien des feuilles et tiges du Carthame au Pakistan.

Une maladie bactérienne desséchant les feuilles et les tiges du carthame (*Carthamus tinctorius* L.) fut détectée en 1985 au Centre National de Recherche Agricole, Islamabad. L'agent causal isolé des plantes malades est une bactérie en bâtonnet, gram-négative, mobile, fluorescente qui est identifiée comme *Pseudomonas syringae* pv. *syringae* sur la base de ses réactions biochimiques et physiologiques. Il est affirmé qu'il s'agit de la première identification de cette bactérie sur Carthame au Pakistan.

Mots clés additionnels : *Pseudomonas syringae*.

I. INTRODUCTION

Bacterial leaf and stem blight incited by *Pseudomonas syringae* pv. *syringae* van Hall was observed on safflower in the germplasm evaluation experiment at National Agricultural Research Centre (NARC), Islamabad in 1985. Diseased plants showed necrotic streaks and translucent spots on leaves in the rosette stage. In severely affected plants, when split longitudinally, dark brown necrosis in pithy tissue of stem was noted. Isolations made from the diseased specimens yielded a green pigmented, gram-negative, rod-shaped motile bacterium. In California (USA), KILSIEWICZ *et al.* (1963) found a similar disease on safflower caused by an unnamed but apparently similar *Pseudomonas*. Later ERWIN *et al.* (1964) from California, and GNANAMANIEKAM & KANDASWAMY (1978) from India, reported a bacterial leaf and stem blight caused by *Pseudomonas syringae*. However, it has not been reported earlier on safflower from Pakistan.

The objectives were to identify the causal agent on the basis of its cultural characteristics, biochemical and physiological reactions and to fulfil Koch's postulates for determining pathogenicity.

II. MATERIALS AND METHODS

A. Isolation and identification

Isolations were made from the water-soaked lesions on the stem and leaves of infected plants of safflower collected from NARC, Islamabad in February 1985. Diseased plant parts were washed thoroughly and small segments (3 mm) of advancing margins of lesions were surface-sterilized in 0.1 p. cent Chlorox, washed in sterile distilled water (SDW) and then placed on King's medium B (KB) (KING *et al.*, 1956). Fluorescent colonies which developed after 48 h incubation at 25 °C were serially sub-cultured on a KB medium to get pure cultures. The isolates were identified and confirmed (PALLERONI, 1984 ; KLEMENT *et al.*, 1964 ; LELLIOTT *et al.*, 1966) for their biochemical, physiological and hypersensitive reactions.

B. Pathogenicity

Two safflower cultivars, PI-248867 and PI-401584 (Indian), generally 4 plants per cultivar in two repli-

cations were used in the pathogenicity tests. Inoculations were made on 4-week-old plants grown in the greenhouse. Before inoculation, plants were covered with plastic bags for 24 h, then inoculated by injecting bacterial suspension in SDW, at absorbance 0.10, with 10^6 colony forming units/ml, in the petiole using a hypodermic needle. Plants inoculated with SDW were kept as controls. After inoculation, the plants along with the control were covered with polyethylene bags for 72 h, and examined daily for disease development.

III. RESULTS AND DISCUSSION

A. Identification

The bacterium produced white cream coloured, smooth or rough fluorescent colonies with green diffusible pigment on KB medium. The isolates were gram-negative, aerobic, oxidative, motile, rod-shaped, measuring $0.6-1.4 \times 1.5-2.0 \mu\text{m}$, acid from glucose, galactose, mannitol and glycerol positive, maltose and lactose negative, levan-positive, arginine dihydrolase-negative, potato rot negative, indol and H_2S negative,

nitrate reduction negative, and gelatin positive (LELIOTT *et al.*, 1966 ; SANDS *et al.*, 1970, 1980). The bacterium was identified as *Pseudomonas syringae* pv. *syringae* van Hall (PALLERONI, 1984). Necrotic reaction on tobacco plants further proved that the bacterium was potentially pathogenic (KLEMENT *et al.*, 1964).

B. Pathogenicity

Pathogenicity tests were confirmed on 4-week-old safflower plants of variety PI-248867 and PI-401584. The bacterium produced typical dark brown, necrotic spots and streaks on the leaf and petiole of inoculated plants after 96 h. More than 60 p. cent of the plants collapsed due to rotting and later died. Plants inoculated with SDW did not develop any disease symptoms. The same bacterium exhibiting identical cultural, physiological and biochemical reactions was consistently reisolated from the necrotic spots on the inoculated plants, while no bacterium was recovered from the leaves inoculated with SDW. Pathogenicity results were similar to those of ERWIN *et al.* (1964) and GNANAMANIEKAM & KANDASWAMY (1978).

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REFERENCES

- Erwin D. C., Starr M. P., Desjardin P. R., 1964. Bacterial leaf and stem blight of safflower caused by *Pseudomonas syringae*. *Phytopathology*, **54**, 1247.
- Gnanamaniekam S. S., Kandaswamy P. R., 1978. Bacterial leaf and stem blight : a new disease of safflower in India caused by *Pseudomonas syringae*. *Con. Sci. (India)*, **47**, 506.
- King E. O., Ward M. K., Raney D. E., 1954. Two simple media for the demonstration of pyocyanin and fluorescein. *Journal Laboratory and Clinical Medicine*, **44**, 301-307.
- Klement Z., Farkas G. L., Lovrekovich L., 1964. Hypersensitive reaction induced by phytopathogenic bacteria in tobacco leaf. *Phytopathology*, **54**, 474-477.
- Klisiewicz J. M., Houston B. R., Peterson L. J., 1963. Bacterial blight of safflower. *Plant Dis. Rep.*, **47**, 964-97.
- Lelliott R. A., Billing E., Hayward A. C., 1966. A determinative scheme for the fluorescent plant pathogenic Pseudomonads. *J. appl. Bacteriol.*, **29**, 470-489.
- Palleroni N. J., 1984. Pseudomonas. In *Bergey's Manual of Systematic Bacteriology*, 141-190. Williams & Wilkins, Baltimore.
- Sands D. C., Schroth M. N., Hildebrand D. C., 1970. Taxonomy of phytopathogenic pseudomonads. *J. Bacteriol.*, **101**, 9-23.
- Sands D. C., Schroth M. N., Hildebrand D. C., 1980. Pseudomonads. In « *Laboratory Guide for Identification of plant pathogenic Bacteria* », 36-44 (Ed. N. W. Schoad) St-Paul, Minnesota, Am. phytopathol. Soc., Monogr.