FIELD REACTION OF DIFFERENT VARIETES OF OLIVE (Olea europaea L.) TO OLIVE KNOT DISEASE CAUSED BY Pseudomonas syringae pv. savastanoi (E.F. SMITH) STEVENS.

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INTRODUCTION

The olive knot disease occurs over the whole Mediterranean area, North and South America, Middle East and North Africa (Photo 1).

Many aspects of the host parasite interaction have been studied (3, 5, 6). It has been reported that there was no correlation between the level of epiphytic inoculum and the degree of the disease development (2, 7).

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In Morocco, the olive knot has existed since the end of 19th Century according to olive growers in the area. The pathogen has been isolated and identified (1). Differences in the attacks of the disease on olive trees in Morocco have been noticed which led to this study of the reaction of different varieties to the pathogen in the field Photo 1.

MATERIELS AND METHODS.

- A 35 years old olive field on the Experimental Station of the National Institute of Agronomic Research at Meknes was chosen for a three year study (1984-86) of the disease reaction of the main olive varieties planted in Morocco, "Meslala", "Picholine Languedoc", Picholine Marocaine" and "Gordale".

The study included :

- Intensity of the disease per tree. The total number of tumors per tree was counted once a year, in July, to evaluate the susceptibility of the four varieties.

- Evaluating of the extent of twig dessication of the olive trees in centimeters for 10 trees of the variety "Meslala". The total length of dessicated twigs was measured and the percentage of dessicated twigs is calculated, based on estimated total length of all twigs on each tree.

- Evaluation of twig growth. Twig lengths were measured in centimeters twice a year, in autumn and spring, on 30 twigs per tree using 10 twigs with no tumors, 10 twigs with one tumor and 10 twigs with 2 tumors. This measurement was done on 10 olive trees of the variety "Meslala".

- Estimation of the number of green bob-olive fruits per tree in July. The number of the "Bob-olive" (green olive bunches) and tumors was counted on a similar group of 10 "Meslala" trees using 6 structural units per tree. Each structural unit was represented by twigs of one, two and three years of age and constituted a proportion of 0,6% of the tree twigs.

This measurement method allows us to estimate the number of green olive bunches (Bob-olives) as well as the number of tumors on representative sampling units chosen according to the volume of the tree. Extrapolations were then made for the whole tree, and correlations between the number of tumors and the number of Bob-olives were calculated.

RESULTS AND DISCUSSION

The studies permitted determination of some different factors that have contributed to the understanding of the olive knot disease in Morocco.

- Distribution of the olive knot. The disease occurs in many areas in Morocco (Fig. 1) and was first noted at Meknes (4). Severe development of the disease was observed in olive fields at Meknes and Marrakech mainly on the variety "Meslala".

- Evaluation of the intensity of the disease on the olive trees. It appears thar the level of susceptibility of existing varieties determines the main support of olive knot and its appearance in a given area. The presence of the hughly susceptible variety "Meslala" increases the possibility of both infection and dissemination of the bacteria.

- Counts of the actual number of tumors per tree on the four varieties of olive, "Meslala", "Picholine Languedoc", "Picholine Marocaine" and "Gordale", showed that "Meslala" was the most affected (Table 1). The number of tumors increased every year for this variety, wheareas "Gordale" appeared immune as no symptoms occured (Table 1). "Picholine Marocaine", the most prevalent variety in the country (98%), appeared to be tolerant in the field with the level of the attack low even in the main olive knot area. "Picholine Languedoc" also appeared tolerant but less so than "Picholine Marocaine".

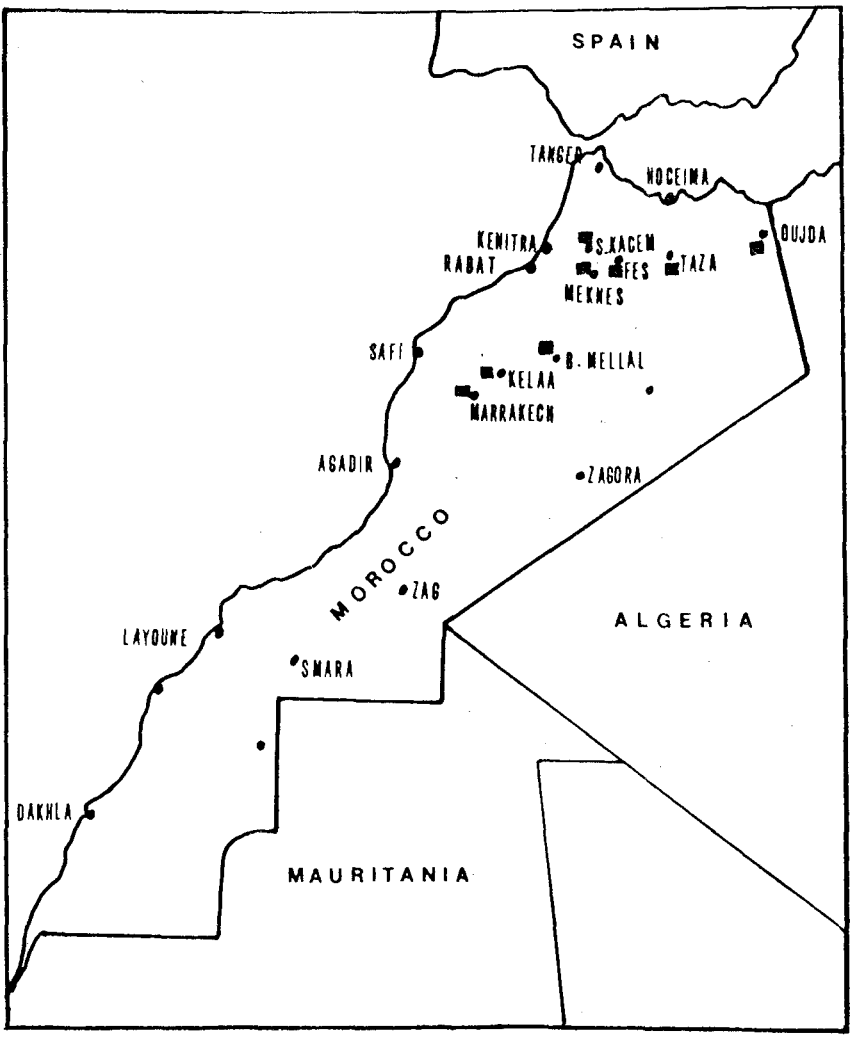
On "Meslala", the intensity of the disease was such that a dessication of twigs occured which was not observed on the other varieties. The percentage of dessicated twigs increased with the number of tumors per tree (Fig. 2). It was observed that dessication begins when the number of tumors per tree reaches four hundred to six hundred (Fig. 2).

Larger numbers of tumors were seen on the West and the North-West side of the olive trees and may be explained by the greater exposure to the prevailing wind and rain.

- Impact of the disease on the vegetative growth. Data also indicated that the disease reduced natural growth of the olive trees. The increasing number of tumors per meter of twig was shown to significantly reduce growth of the twigs (Table 2).

- Impact of the disease on Bob-olives produced. It was found that the number of tumors was linearly related to the number of Bob-olives produced. Statistically, the correlation was negative (r = 0,69) (Fig. 3). In each structural unit, the number of Bob-olives decreased when the number of tumors increased. It was estimated that a disease intensity of 55 tumors per structural unit (S.U.) lead to the loss of half of the fruit production of the tree, consequently, the whole harvest can be practically affected.

Fig. 1 : DISTRIBUTION OF OLIVE KNOT DISEASE IN MOROCCO



■ = PRESENCE OF DISEASE

Fig. 2 - **RELATIONSHIP BETWEEN DESSICATION OF MESLALA TWIGS AND THE NUMBER OF TUMORS PER TREE**

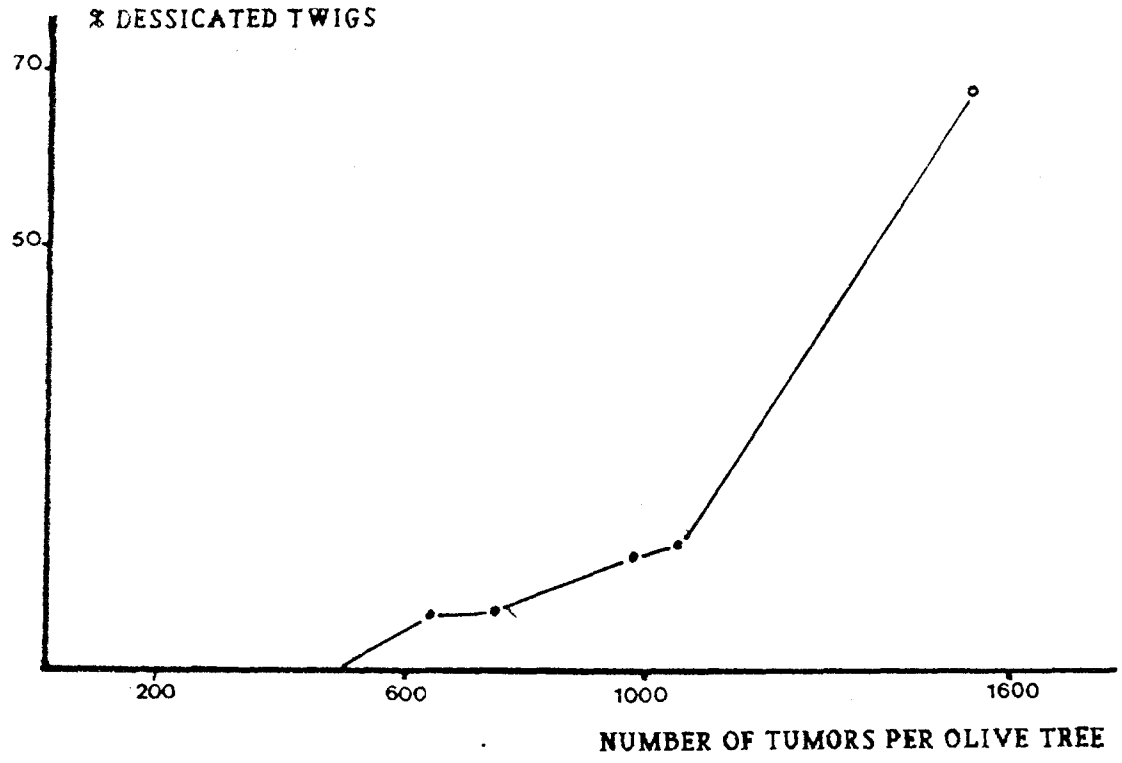


Fig. 3 - **CORRELATION BETWEEN THE NUMBER OF BOB-OLIVES AND NUMBER OF TUMORS PER STRUCTURAL UNIT ON MESLALA**

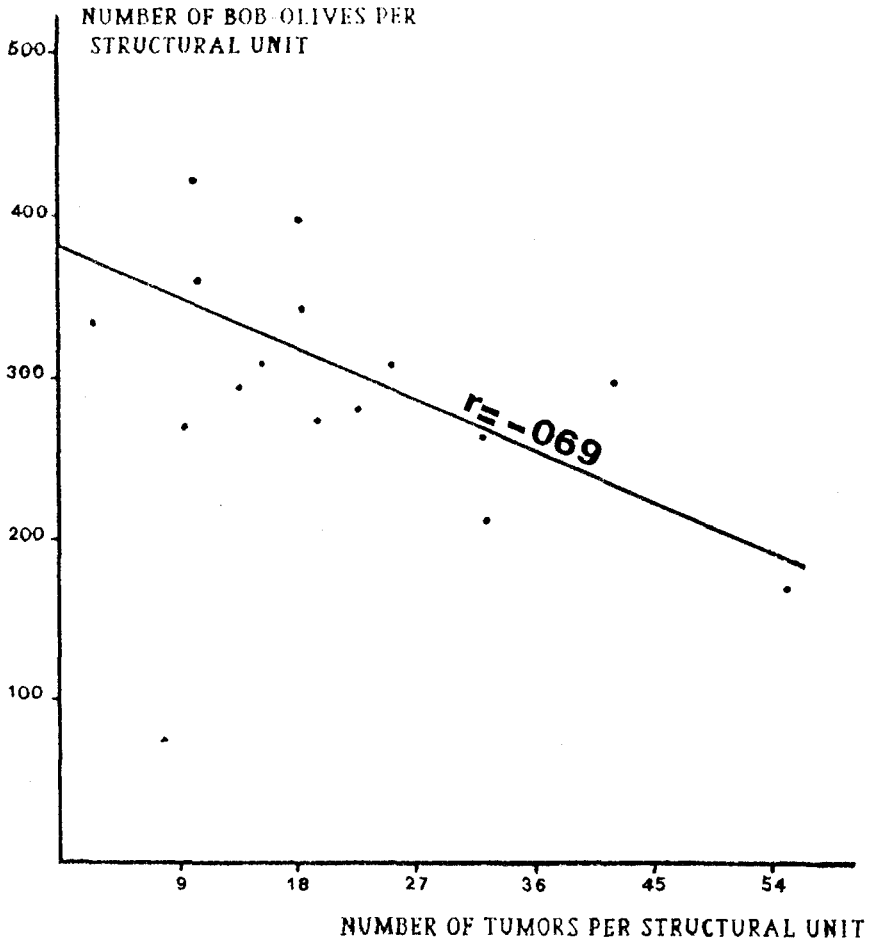


Table I : **EVALUATION OF THE INTENSITY OF THE OLIVE KNOT DISEASE IN FOUR OLIVE VARIETIES OVER THREE SEASON IN MOROCCO.**

VARIETY	NUMBER OF OBSERVED TREES	PERCENTAGE OF DISEASED TREES (%) AND AVERAGE NUMBER OF TUMORS (T) PER TREE (t)					
		1984		1985		1986	
		%	T/t	%	T/t	%	T/t
MESLALA	88	100	174.1	100	192.7	100	527.4
P. LANGUEDOC	54	37	4.3	44	5.5	85	8.8
P. MAROCAINE	93	2	2.5	5.6	3	45.2	6.7
GORDALE	67	0	0	0	0	0	0

Table II : **RELATIONSHIP BETWEEN THE TWIG GROWTH OF MESLALA IN THE FIELD AND THE NUMBER OF TUMORS PER METER ON 300 TWIGS, DURING 3 YEARS.**

AVERAGE NUMBER OF TUMORS PER METER OF TERMINAL TWIGS	AVERAGE OF TWIG GROWTH IN LENGTH IN CM
0	5.2
1	3.2 a
2	2.1 b

(a & b) SIGNIFICANTLY DIFFERENT FROM HEALTHY CHEK

CONCLUSION

The olive knot can have a substantial impact on the tree growth and fruit production. In Morocco the study also led to the validation of a sampling method for assessment of disease severity in olive tres. The method is based on the use of structural unit, 6 S.U. per tree, on 10 trees. This method makes the task of estimating disease development easier by allowing us to obtain the same results without counting all tumors and Bob-olives on each tree in the field. Difference in varietal resistance is a characteristic that can be used in controlling the disease.

RESUME

La tuberculose de l'olivier est largement répandue partout où on culture l'olivier au Maroc.

L'étude de la réaction naturelle à la maladie de quatre différentes variétés d'olivier, âgées de 35 ans, a montré que la "picholine marocaine" est tolérante à la maladie tandis que la "Meslala" est une variété très sensible et la "picholine du Languedoc" sensible. La variété "Gordale" est immune et ne montre pas de symptômes alors que la maladie s'est manifestée dans cette parcelle de 4 variétés dès 1960.

L'intensité de la maladie a été évaluée en utilisant 6 unités structurales (US) par arbre, sur 10 arbres par variété. L'intensité de la maladie à un impacte sur la croissance végétative des rameaux d'olivier et réduit le nombre de fruit par unité structurale. Il a été estimé que 50% de perte au champ en olive est causée par un nombre de 55 tumeurs à tuberculose par unité structurale. Quand ce nombre excède 600 tumeurs par arbre, le dessèchement des rameaux est observé tel que c'est le cas chez la variété "Meslala".

SUMMARY

Olive knot disease has been widely spread in Morocco owing to the increased of olive plantations. The disease can be found in all areas of Morocco where olive trees are planted.

Three years study of the reaction of for different olive varieties to the disease has shown that the most widely grown variety "Picholine Marocaine" is tolerant whereas another, "Meslala" is very susceptible. The variety "Gordale" proved to be immune showing no symptoms.

Intensity of the disease was evaluated using six structural units (US) per tree, on ten trees per variety. The intensity of the disease has an impact on twig growth and consequently reduces the number of fruit per structural unit. It is estimated that a loss of 50 percent of yield was caused with an average disease intensity of 55 tumors per structural unit, and when this number exceeds 600 tumors, dessication of the twings appeared in the variety "Meslala".

ملخص

سل الزيتون ينتشر بشكل واسع في كل مكان يزرع فيه الزيتون بالمغرب.

كما أن دراسة رد الفعل الطبيعي على المرض عند أربعة اصناف مختلفة من الزيتون عمرها خمسة وثلاتين سنة بينت أن «بيشولين المغربية» تتحمل المرض، بينما «مسلالة» هي صنف حساس جدا و «بيشرلين لا نكدك» حساسة صنف «كوردال» لديه مناعة كما انه لم يظهر أية اعراض رغم ظهورهذا المرض في هذه البقعة المغروسة الاصناف الاربعة المذكورة منذ 1960.

وقد تم تقييم شدة المرض باستعمال ستة وحدات بنيوية (خمسة واربعين) على عشر شجرات من كل صنف. ولشدة المرض تأثير على النمو النباتي لاحضان الزيتون كما يحد من عدد الحبات في الوحدة البنيوية. وقد قدرنا ان 50 بالمائة من خسائر الزيتون في الحقل ناتج عن خمسة وخمسين ورم سلي في كل وحدة بنيوية اذا تجاوز هذا العدد ستة مائة في كل شجرة، يلاحظ يبس الاغصان كما هي الحال عند صنف «مسلالة»

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