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Population Dynamics of *Rhopalosiphum padi* (L.) on Wheat and *Myzus persicae* (Sulzer) on Spinach under Irrigation from Two Different Water Sources[1]

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Abstract. Seasonal abundance of *Myzus persicae* (Sulzer) on spinach leaves and *Rhopalosiphum padi* (L.) on wheat stems were estimated in 1988 and 1989. Two types of water were used in irrigation (fresh water and treated municipal waste water). The aphid densities of the first season on both crops were significantly higher than in the second season. *M. persicae* and *R. padi* were first detected in late December and reached a peak early February. Type of water had shown no significant effect on population densities of both aphid species.

Introduction

Myzus persicae (Sulzer) and *Rhopalosiphum padi* (L.); are the most important insect pests of spinach and wheat, respectively. *R. padi* can significantly reduce yield of wheat if *R. padi* feeds one week at a density of 30-40 aphids per stem [1]. The assessment of pest population dynamics is a major component of integrated pest management programs [2]. The objective was to study the effect of type of irrigation water on the population density of *M. persicae* on spinach and *R. padi* on wheat plants.

Material and Methods

The present study was conducted at the Experimental and Research Station,

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College of Agriculture, King Saud University, Deirab, for two successive seasons (1988-1989 & 1989-1990). Area of wheat and spinach fields were divided each into 10 plots (3 × 4 m) in two parallel lines. Plots of one line were separated from each other by belts 1 m wide and from those of the neighboring line by a belt 3 m. Five plots for each crop were selected randomly and were irrigated with treated municipal waste water (TMWW), the other five plots were irrigated with fresh water (FW). Wheat plots were seeded on the 16-11-1988 and 4-12-1989 with certified seeds of *Triticum aestivum* cv. Yecora Rojo, at the rate of 180 gm/plot. Spinach plots were seeded on the 17-11-1988 and 19-11-1989 with certified seeds of *Spinacia oleracea,* at the rate of 400 gm/plot.

To study the population density of both aphid species, five wheat stems from each wheat plot and five spinach leaves per spinach plot were taken randomly at weekly interval. The number of aphids were counted and recorded.

The mean number of aphids of TMWW and FW treatments were compared using General Linear Model with a program from the Statistical Analysis System [3].

Results and Discussion

The population densities of *R. padi* and *M. persicae* are presented in Figs. 1 and 2, respectively. Aphid densities, of both species, were significantly higher in the first than in the second season, probably due to the environmental factors of the first season being more favorable for aphid populations development.

The population densities of both aphid species were low until late January (Fig. 1). Both aphids reached their peaks abundance in early February where mean temperature around 20°C. The highest mean numbers of *R. padi* per wheat stem was 11 and 0.8 for the first and second seasons, respectively. Whereas, the highest mean numbers of *M. persicae* per spinach leaf were 17 and 0.4 for the first and second seasons, respectively. Dean [4] found that *R. padi* has the highest intrinsic rate of increase at 20-25°C. Blackmer and Bishop [5] found that *R. padi* population peaked when mean field temperature was 20-25°C. The optimum temperature for the development and reproduction of *M. persicae* was 25°C [6].

Type of water (FW and TMWW), generally had no significant effect on the mean number of *R. padi* and *M. persicae* in both seasons. However, early in the first season (from 21 December to 18 January), number of *M. persicae* per leaf of FW

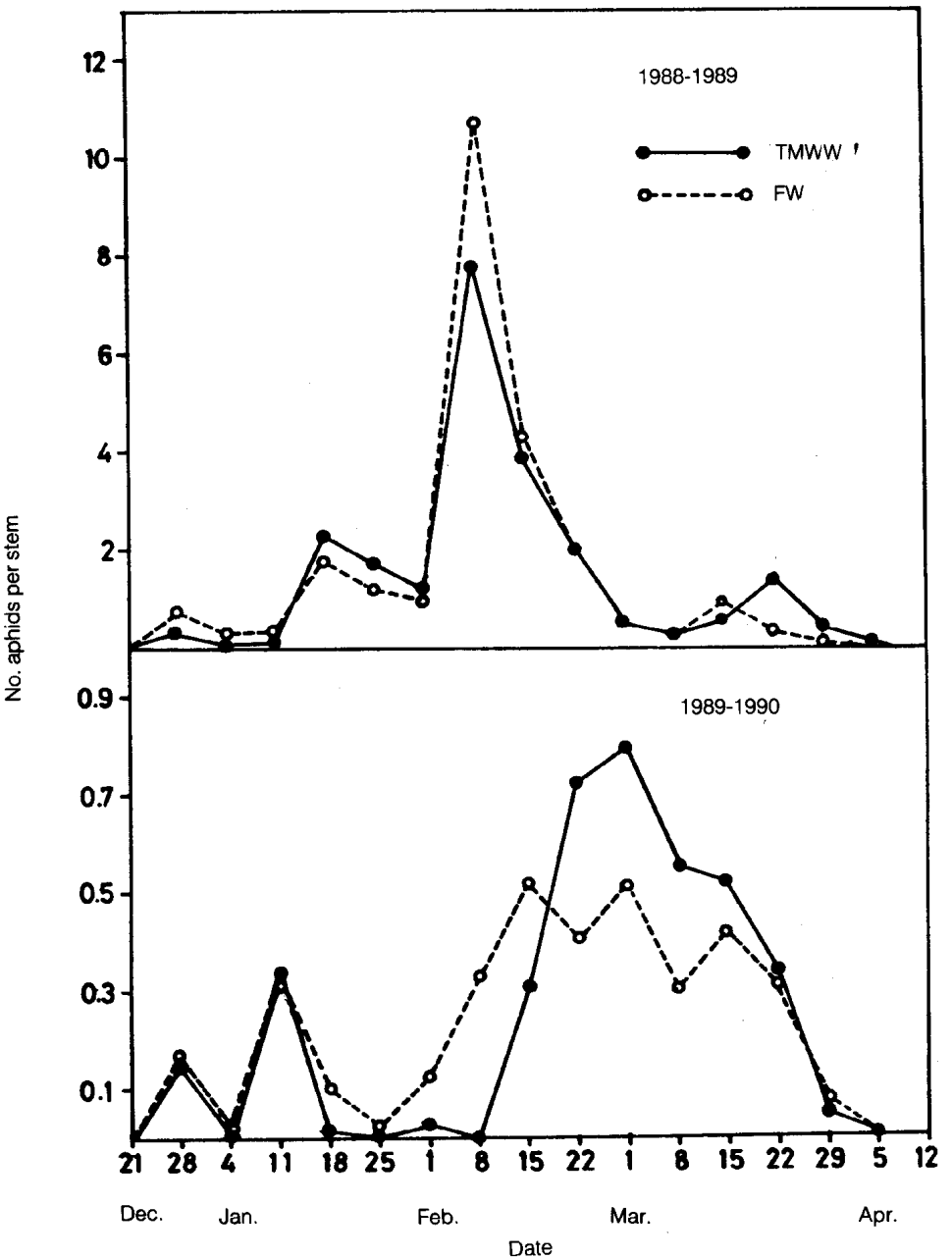

Fig. 1. Population dynamic of *Rhopalosiphum padi* on wheat irrigated with fresh water and treated municipal waste water.

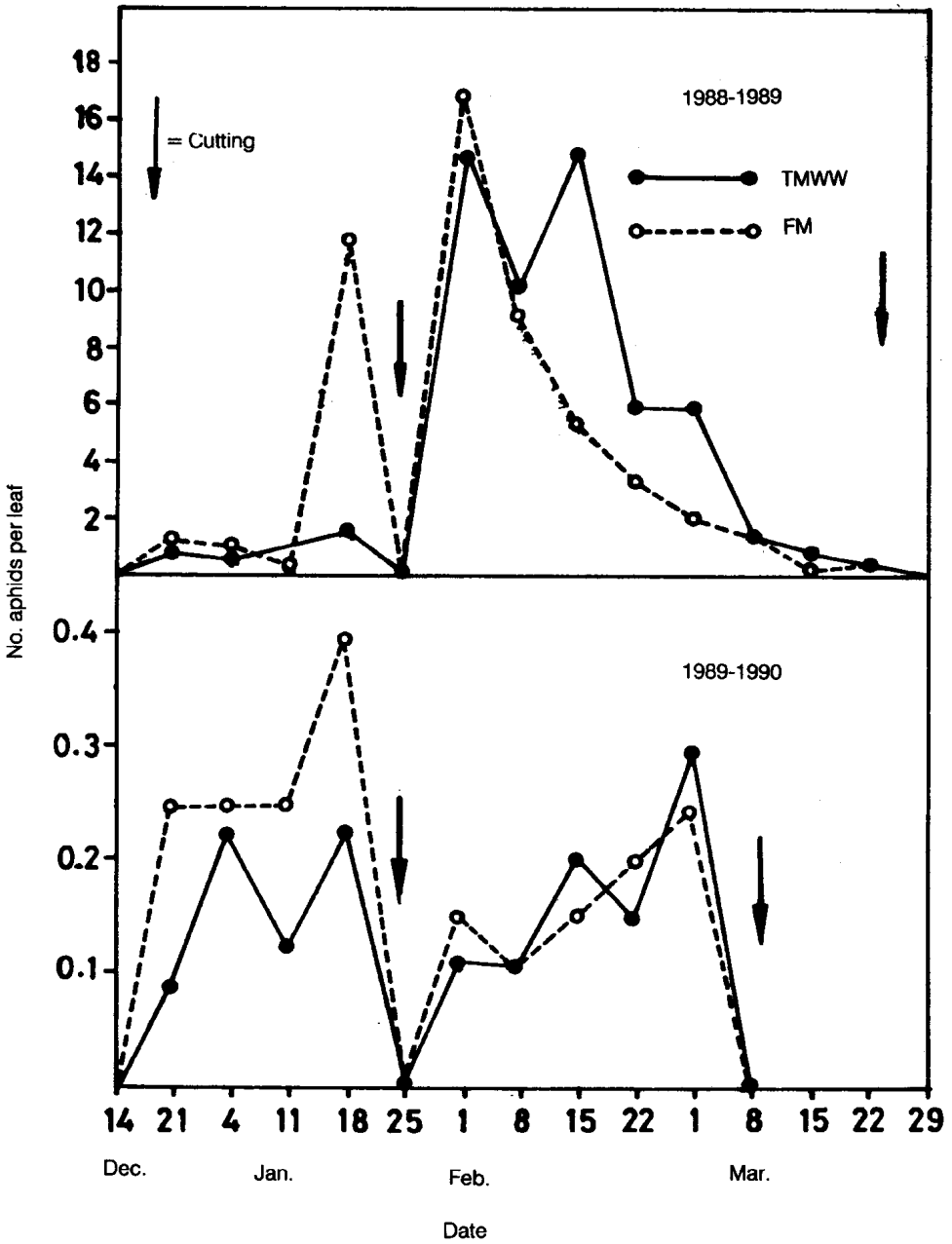

Fig. 2. Population dynamics of *Myzus persicae* on spinach irrigated with fresh water and treated municipal waste water.

plots was significantly higher than TMWW plots. In contrast, late in first season, *M. persicae* density of TMWW plots was significantly higher than FW plots.

Shortage of water is probably the main factor limiting the agricultural development in arid and semi-arid areas. TMWW is a good alternative water resource for agricultural irrigation. Moreover, TMWW is rich in nutrients for crops and it is a good method to recharge ground water [7]. However, TMWW has a potential health risk and it may increase heavy metals and organic residues in soil.

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الكثافة العددية لحشرة المن *Rhopalosiphum padi* (L.) على نبات القمح ولحشرة المن *Myzus persicae* (Sulzer) على نبات السبانخ باستخدام مياه الصرف الصحي والماء المعالج في الري

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(ورد البحث في ١٤١٥/١٠/٢٥هـ؛ وقُبل للنشر في ١٤١٦/٦/٢٢هـ)

ملخص البحث. هذا جزء من مشروع إمكانية استخدام مياه الصرف الصحي المعالج في الري الزراعي وآثاره الضارة على النبات والحيوان والإنسان والممول من قبل مدينة الملك عبدالعزيز للعلوم والتقنية. ويهدف البحث إلى دراسة الكثافة العددية للمن على نبات القمح والسبانخ ولمدة موسمين متتاليين (١٩٨٨-١٩٨٩م و١٩٨٩-١٩٩٠م) وباستخدام الماء المعالج والماء العادي. وقد أجري البحث بمحطة التجارب الزراعية بديراب.

تم زراعة كل من القمح والسبانخ في عشرة أحواض (٣×٤م للحوض) وتم اختيار خمسة أحواض من كل محصول عشوائيًا ورويت بالماء العادي والخمسة الأخرى بالماء المعالج. وقد تم أخذ خمسة سيقان قمح من كل حوض قمح وخمس ورقات سبانخ من كل حوض سبانخ عشوائيًا في كل أسبوع وعد حشرات المن على كل منهم.

اتضح من نتائج البحث أن الكثافة العددية لحشرات المن في الموسم الأول كانت أعلى معنويًا من الموسم الثاني. وبدأ ظهور حشرات المن في ديسمبر، وقد سجلت أعلى كثافة عددية للمن في شهر فبراير. ونوع الماء المستخدم في الري لم يؤثر على الكثافة العددية لحشرات المن على كل من القمح والسبانخ.