

EFFECT OF SPRINKLER IRRIGATION AND NITROGEN FERTILIZATION ON WEED INFESTATION OF POTATOES CANOPY ON A POOR SANDY SOIL

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Introduction

Usage of such modern technologies like sprinkler irrigation in potatoes cultivation on sandy soils in Poland is purposeful (Peszek and Grzelak 1990). On the other hand, under irrigation there are favourable moisture-nutritive conditions not only for the proper growth of potatoes but also for weeds development (Bieszczad and Pekarnik 1990, Karczmarczyk et al. 1983, Rojek 1980).

The object of the study was to recognize the effect of sprinkler irrigation and nitrogen fertilization on weed infestation of potatoes on the very light soil.

Material and methods

Field experiments were carried out in 1994-1997 at Kruszyn Krajeński (nearly Bydgoszcz) on the soil of the VI use class (very poor rye complex) using the randomized block's method of a three-factorial (cultivars: *Drop*, *Mila*; irrigation: control, with irrigation; N-fertilization: $N_1=75$ kg N/ha, $N_2=125$ kg N/ha) split-plot system with three replications. Potatoes were cultivated using the full dose of farmyard manure (35 t/ha), 80 kg P_2O_5 /ha and 140 kg K_2O /ha. The forecrop was leguminous-cereal crop mixture. No herbicide was used. An assessment of state of weed infestation have been conducted before harvesting using numerical-gravimetric method (Bieszczad and Pekarnik 1990). Climatic conditions and irrigation of experiments are characterized in Table 1.

TABLE 1. Course of weather and sprinkler irrigation in Kruszyn Krajeński during the years 1994 - 1997 on the background of the long - term values.

Years	Month						
	IV	V	VI	VII	VIII	IV - VIII	
Air temperature [°C]							
1949-1995	7,2	12,7	16,2	17,9	17,3	14,4 *	
1994-1997	7,4	12,1	16,1	18,9	18,8	14,7	
Precipitation [mm]							
1891-1980	35	52	57	76	60	280 **	
1994-1997	21	61	54	67	63	266	
Irrigation rates [mm]							
1994-1997	<i>Mila</i>	0	0	26	56	47	129 **
	<i>Drop</i>	0	0	26	56	37	119

* - average value, ** - sum

Results and discussion

Sprinkler irrigation significantly increased dry matter of weeds (Tab. 2 and Fig.1). Similar results have been obtained previously by other authors in better soil conditions (Bieszczad and Pekarnik 1990, Rojek 1980) while in experiments of Karczmarczyk et al. (1983), irrigation in most cases decreased weeds' weight.

In spite of insignificant impact of irrigation on the number of weeds, a

TABLE 2. Weed infestation of potatoes (4 year and 2 cultivar average)

Treatment	N ₁	N ₂	Average
Dry matter of weeds [g/m ²]			
Non-irrigated	34,8	28,0	31,4
Irrigated	145,6	148,3	146,9
Average	90,2	88,1	89,2
Number of weeds [pcs/m ²]			
Non-irrigated	52,2	45,5	48,8
Irrigated	82,7	72,5	77,6
Average	67,4	59,0	63,2

LSD_{0,05} for irrigation: dry matter (30), number of weeds (n.s.), n.s. - not significant for N-fertilization: dry matter (n.s.), number of weeds (n.s.)

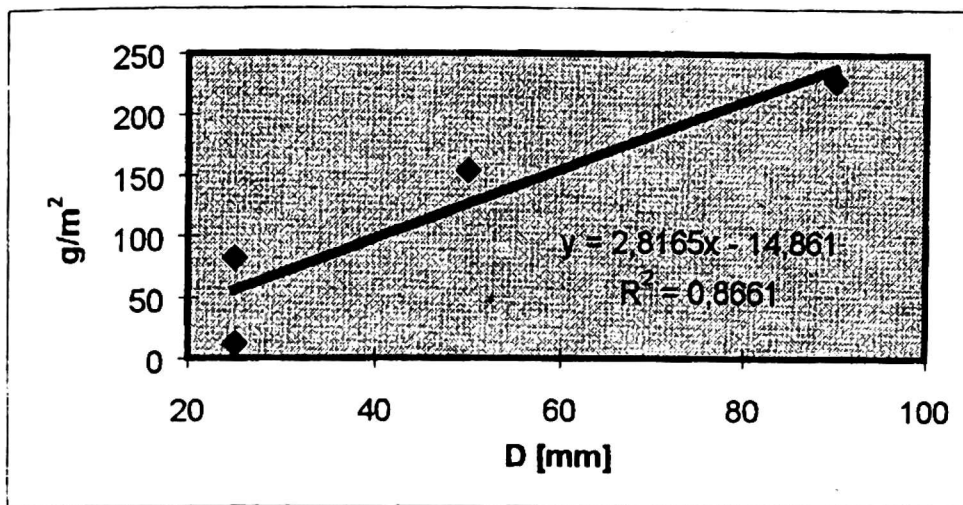


FIG.1. Relationship between irrigation rate of August and dry matter of weeds on irrigated plot cv. *Mila* fertilized by rate of 125 kg N/ha.

growth tendency has occurred, average during four years studied. Also Rojek (1980) has noted an increase of the number of weeds in irrigated potato canopy whereas in other experiments the tendency was opposite (Karczmarczyk et al. 1983). Increasing nitrogen fertilizing usually decreased weed infestation of potatoe canopy (Tab.2) both on non-irrigated and irrigated treatments. It is conformable to other autors' results (Bieszczad and Pekarnik 1990, Karczmarczyk et al. 1983, Rojek 1980).

The results can be usefull in planning of integral methods of weeds control.

Conclusions

- Sprinkler irrigation significantly increased dry matter of weeds.
- The number of weeds on the surface unit was higher under irrigation as compared to control treatments.
- Increasing nitrogen fertilization in most cases decreased weed infestation of potatoes' canopy.

Literature

BIESZCZAD ST., PEKARNIK K. 1990. *Zachwaszczenie roślin okopowych w warunkach deszczowania i zróżnicowanego nawożenia mineralnego*. Zesz. Nauk. AR Wrocław 195, Melioracja XXXVIII: 145-158.

- KARCZMARCZYK ST., HOFFMAN-KĄKOL I., STANKIEWICZ J. 1983. *Porównanie plonowania ziemniaków i buraków cukrowych uprawianych na glebie lekkiej z zastosowaniem deszczowania i zróżnicowanego nawożenia mineralnego. Cz. II. Zachwaszczenie łąnów. Zesz. Nauk. AR Szczecin 100: 59-65.*
- PESZEK J., GRZELAK B. 1990. *Wpływ deszczowania i nawożenia azotem na plonowanie ziemniaków na glebie bardzo lekkiej. Zesz. Nauk. ATR Bydgoszcz 174, Rolnictwo 30: 115-126.*
- ROJEK ST. 1980. *Wpływ deszczowania i nawożenia azotowego na zachwaszczenie łąnu ziemniaków późnych. Zesz. Nauk. AR Wrocław 128, Melioracja XXIII: 57-61.*

Summary

Effect of sprinkler irrigation and nitrogen fertilization on weed infestation of potatoes canopy on a poor sandy soil. On the basis of field experiments conducted during the years 1994-1997 concerning the effect of sprinkler irrigation and nitrogen fertilization on weed infestation of potatoes on the very light soil, it was concluded that irrigation significantly increased the weight of weeds and influenced on their greater number on the surface unit. Increasing nitrogen fertilizing in most cases decreased weed infestation of potatoes.

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