



SOME COMMENTS ON SZCZEPKOWSKI'S SPRINKLER IRRIGATION MACHINE AND THE EARLY DAYS OF SPRINKLER IRRIGATION OF PLANTS IN THE WIELKOPOLSKA AND KUJAWY REGION

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Summary

The paper describes the first attempts at the sprinkler irrigation of plants in Poland which took place in the Kujawy and Wielkopolska Region more than a hundred years ago – at the early 20th century. The first original sprinkler irrigation machine was designed and the used by Mr Władysław Szczepkowski. The sprinkler irrigation machine he constructed in 1911, after earlier a few year trials (at Łęg, the Śrem county, the Poznań Province) was the first sprinkler irrigation machine built at such a large scale in Europe. The system developed by Szczepkowski found many followers in Germany, France, England and the USA. Szczepkowski's sprinkler irrigation machine became a prototype for many later designs, e.g. the irrigation machines applied today rolled sprinkling pipelines.

Key words: sprinkler irrigation machine, Mr Władysław Szczepkowski, Łęg, Wielkopolska, Kujawy, Bydgoszcz

INTRODUCTION

Mr Józef Dzieżyc in the manual 'Nawadnianie roślin' (*Plant Irrigation*) of 1974 reports on the publication issued in Polish in 1912 'Walka z suszą' (*Combating drought*), Mr St. Biedrzycki discussing the advantages of the sprinkler system says that with sprinklers agriculture has acquired not only a huge measure to combat drought, but an effective lever of progress which must be used at in

the best way and the earliest convenience! (Dzieżyc, 1974). More than 100 years have passed since the first sprinkler irrigation trials in the vicinity of Bydgoszcz as, as reported by Dzieżyc, the first experiments with crops sprinkler irrigation were performed as early as over 1904-1905 (Dzieżyc, 1974) or 1904-1908 (Dzieżyc, 1988) at Łęg in the vicinity of Bydgoszcz (the former Grand Duchy of Posen). The designer and the user of the first sprinkler irrigation machine was Mr Szczepkowski, a farm owner (Dzieżyc, 1988). Similar findings are reported by Grabarczyk (1991) saying that over 1904-1908 attempts were made with plant sprinkler irrigation at Łęg in the vicinity of Bydgoszcz on Szczepkowski's farm. He designed a rolling sprinkler irrigation machine which became the prototype of a series of other European solutions. Nowaczyk (1976), on the other hand, claims that sprinkler irrigation research was performed over 1904-1905 on an experimental farm in the vicinity of Bydgoszcz, and he goes on to say that Mr Szczepkowski designed his first sprinkling device in 1911. Later it operated, with very good effects, for many years in the Łąg estate (the Śrem county, the Poznań Province).

The aim of this study was to describe the first successful plant sprinkler irrigation trials on Polish soil launched by Mr Władysław Szczepkowski. The study is a further development of the communication presented during the 20th Jubilee Symposium of Plant Irrigation in Tleń – Bydgoszcz in 2013 (Rolbiecki 2013).

MATERIAL AND METHODS

Applying the available literature and the information acquired from the National Museum of Agriculture and Agri-Food Industry at Szreniawa, there were described the first successful trials with sprinkler irrigation in Poland. A brief description of the device designed and constructed by Mr Władysław Szczepkowski has been provided and there have been listed estates where Polish landowners introduced similar devices. Photographs of the sprinkler irrigation machine model and the layout of the device distribution in the field are given.

SZCZEPKOWSKI'S SPRINKLER DESCRIPTION

Biedrzycki (1912), cited by Dzieżyc (1988), writes that Szczepkowski's sprinkler irrigation machine consisted of battery of wheels on trolleys connected with each other with sackcloth pipes. The sackcloth pipe connected it also with the pump. The device can be thus treated as the rolling sprinkler prototype (Photos 1 & 2).



Photo 1. Szczepkowski's sprinkler irrigation machine model at the National Museum of Agriculture and Agri-Food Industry at Szreniawa (photo by Roman Rolbiecki)



Photo 2. Szczepkowski's sprinkler irrigation machine according to the print at the National Museum of Agriculture and Agri-Food Industry at Szreniawa (photo by Roman Rolbiecki)

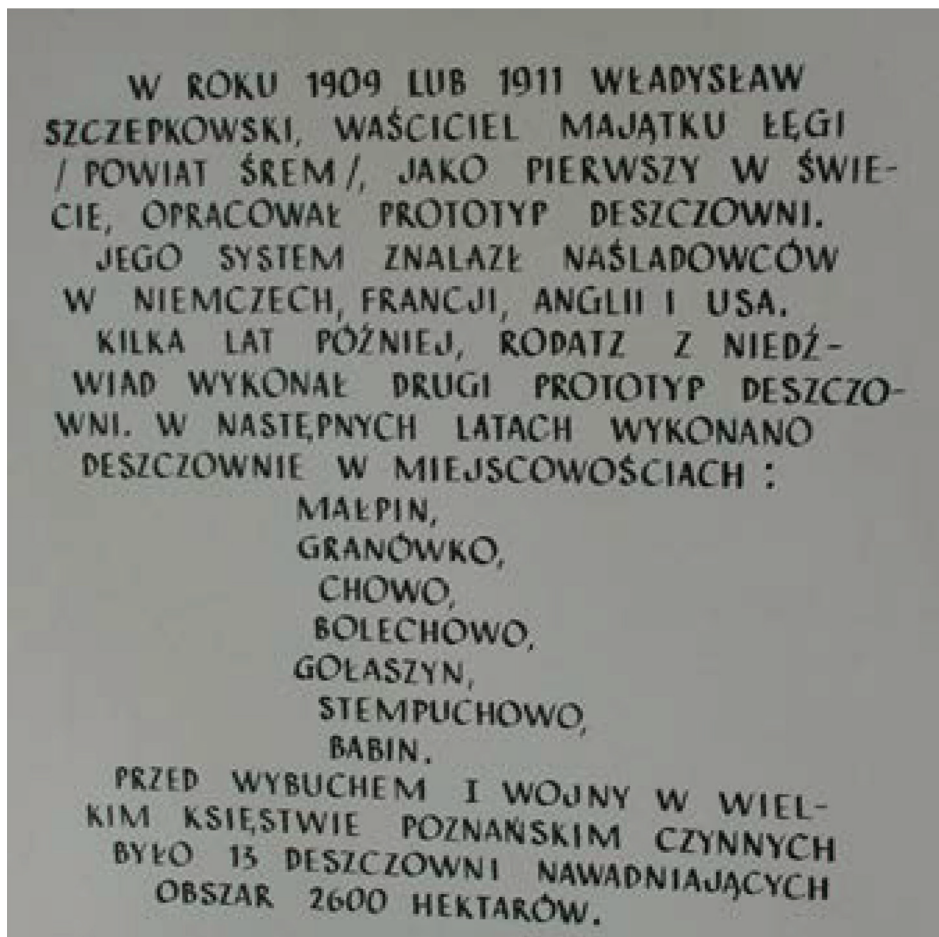
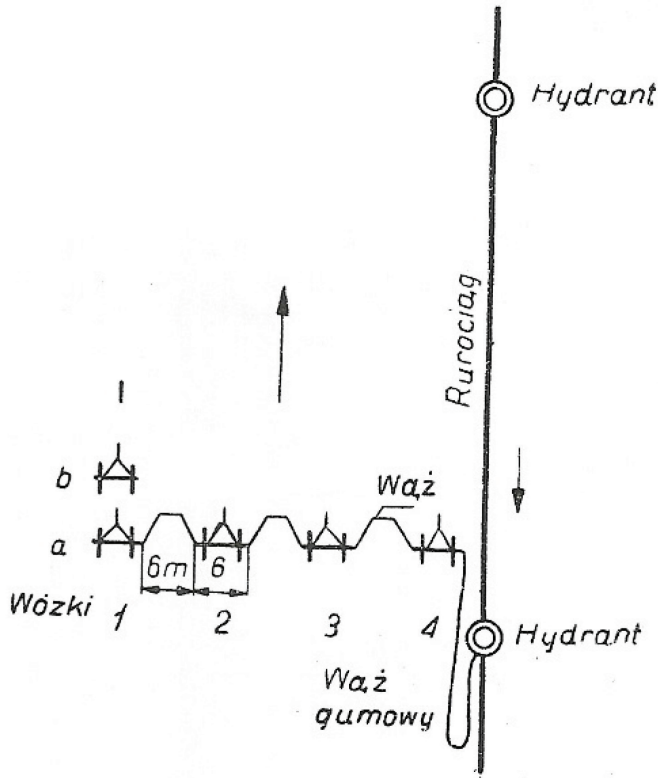


Photo 3. Information on Szczepkowski's sprinkler irrigation machine at the National Museum of Agriculture and Agri-Food Industry at Szreniawa (photo by R. Rolbiecki)

Zakaszewski (1956), providing characteristics of Szczepkowski's sprinkler irrigation machine, reports on the device consisting of battery made of 15 two-wheel trolleys with the axles made from pipes iron; each trolley had two vertical pipes branching-out from the axial pipe at its ends, sprinkling water 1.50 m high over the ground. The trolleys were connected with sackcloth hoses; the same sackcloth hose (it seems that it is mistakenly described as 'rubber', SR in figure) 30 m long, connected the first trolley with the hydrant on the distribution pipeline (Figs 1-2). During the operation of the sprinkler irrigation machine, trolleys were successively moved 4-6 m away, which corresponded to the sprinkled belt

width. A high number of sackcloth hoses, getting fast destroyed due to an ongoing movement and a considerable weight of the trolleys were a defect of the system neglected in that form the idea of which, however, was followed in the types applied today'. A similar description and the same diagram (again: with 'rubber' hose SR) is reported by Nowaczyk (1976). A more developed Szczepkowski's sprinkler irrigation machine diagram is provided by Baranowski (1919b) (Fig. 3), saying, at the same time, that Szczepkowski, after a few-year trials, in 1911 launched spraying bigger areas at Lęg. In the following year he performed watering fields in the area of about 2500 morgens in 4 divisions (1 Prussian morgen = 0.26 ha, SR). Water is pumped from the Warta River applying the electric power of three electromotors. Next to the above (...) mobile sprinkler, Szczepkowski arranged a fixed device with the pipelines dug-in in 200-morgen field specially to produce green feed, early cabbage and *Panicum*.



Deszczownia Szczepkowskiego

Figure 1. Szczepkowski's sprinkler irrigation machine diagram (according to Zakaszewski (1956), after Nowaczyk (1976))

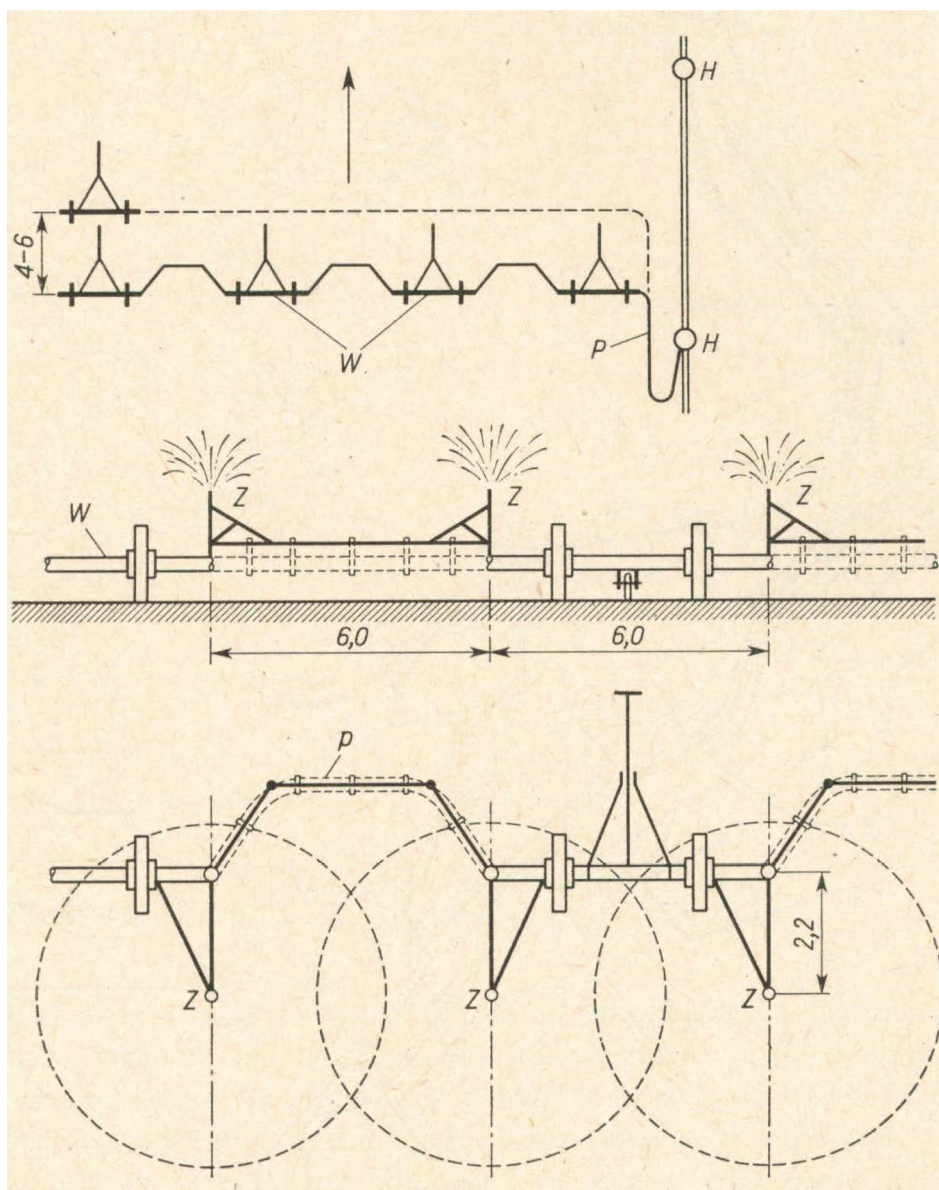


Figure 2. Sprinkler irrigation machine constructed by Szczepkowski, Poznań 1911 (according to Skotnicki and Zakaszewski), cited after Ostromecki (1973). Explanations: The battery of a dozen or so two-wheel trolleys (*W*) with the axles made from steel pipes connected with flexible hoses (*p*) formed a mobile pipeline, supplying sprinklers (*Z*) distributed at the end of the trolleys. The entire device was connected to hydrants (*H*) also with a flexible hose (*P*).

Szemat deszczowni systemu Szczepkowskiego-Moegelina

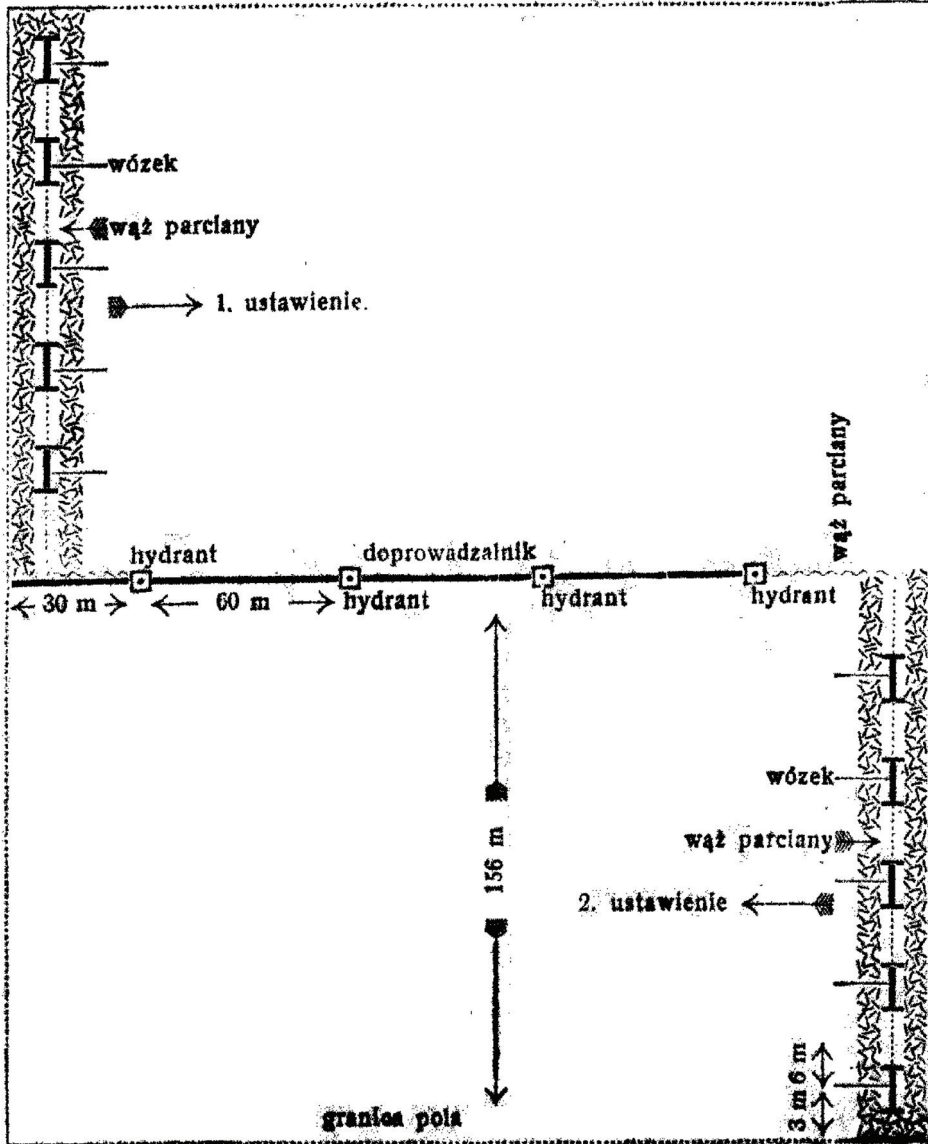


Figure 3. Szczepkowski's sprinkler irrigation machine diagram according to Baranowski (1919)

Szczepkowski's sprinkler irrigation machine turned out to be a prototype for many foreign firms which started the production of similar devices, winning more and more supporters. Drupka (1972) writes that the devices of the Polish inventor, Mr Andrzej Szczepkowski, were one of the first in Europe. Zakasze-wski (1956) reports on the sprinkler constructed by Szczepkowski was not only the first on Polish soil but, at the same time, the first sprinkler at such a large scale in Europe. It seems that Drupka (1972) provides a mistaken first name of Mr Szczepkowski. In the National Museum of Agriculture at Szreniawa there is the first name of Władysław (Photo 2), which is confirmed by Szmidt (2001, 2010) saying that Łęg had become the first village on Polish soil where artificial field irrigation was applied. The owner of the estate over 1904-1920 was Mr Władysław Szczepkowski who took over the power at Śrem during the Wielko-polska Uprising and then he was the head of the Śrem county.

Klawe (2001) says that in 1912 in Wielkopolska there was a mass emergence of the sprinklers based on the concept by Mr Władysław Szczepkowski from Łęg in the vicinity of Śrem where the area of 725 ha was sprayed. Water was taken from the Warta River using the pumps driven by electric motors and traction engines. The device consisted of 9000 m of fixed pipes and 4000 m of mobile pipes on fifty trolleys. Water was pressed with centrifugal pumps with the capacity of 100 litres per second; three diesels were driving generators providing electricity to electric motors. To operate the entire sprinkler, 12 people were hired. In 1912 in Wielkopolska there were already operating 10 installations of the Szczepkowski-Moegelin system.

Following Szczepkowski, similar devices were also introduced by other Poznań landowners. Różański (1926) claims that before the war the sprinklers were arranged according to the Szczepkowski-Moegelin system (Poznań) in the Grand Duchy of Posen in the following estates: Babin, Cichowo, Gołaszyn, Granówko, Iwno, Łęg, Melpin, Staw, Stempuchowo and in the Upper Silesia in Marschwitz. According to the data available from the Museum of Agriculture at Szreniawa (photo 3), before the outbreak of WW I in the Grand Duchy of Posen 13 sprinkler irrigation machines, covering the total area of 2600 ha, were active (operated).

Nowaczyk (1976) claims that Szczepkowski made the first trial in Poland to mechanize field irrigation. The sprinkler irrigation machine he constructed (at Łęg, the Śrem county, the Poznań Province) was the first sprinkler irrigation machine in Europe at such a large scale and it became the prototype of many later structures, e.g. today's rolling sprinklers. The information available at the National Museum of Agriculture and Agri-Food Industry at Szreniawa (photo 3) demonstrates straight away that Władysław Szczepkowski developed the sprinkler prototype as the first one in the world, and the system found its followers in Germany, France, England and the USA. Slightly different data is given by Ostromecki (1973) who, based on ICID data, reports on the first patents for the

entire sprinkler systems (or respective parts of the apparatus) were noted much earlier; already since 1877. The author also goes on to say further that in Poland sprinkler irrigation were known for a long time (there were even original solutions of rolling sprinkler irrigation machine dating back to 1911), however, they were applied to a little extent.

There is still something to be explained; the information that plants were sprinkler-irrigated on the farm in the vicinity of Bydgoszcz. For example, Nowaczyk (1976) claims that research into sprinkler irrigation were performed on the experimental farm in the vicinity of Bydgoszcz. Already cited Dzieżyc (1974, 1988) and Grabarczyk (1991) even locate Szczepkowski's estate in the vicinity of Bydgoszcz. The attempts with plant irrigation did take place in the vicinity of Bydgoszcz, however, they were made (e.g. by Prof. Krüger, the head of the land improvement division) in the then government Kaiser-Wilhelm Institut in Bydgoszcz (Baranowski 1919a, Peszek & Źarski 1990). The results of those experiments (trials) are provided by Baranowski (1919) in yet other, not cited here, issues of the weekly, 'Ziemianin' (*Landowner*).

RECAPITULATION

The first plant sprinkler irrigation attempts in Poland took place in the Kujawy and Wielkopolska Region more than hundred years ago; in the early 20th century (1904-1908: Krüger from Kaiser-Wilhelm Institut in Bydgoszcz and 1909-1911: Szczepkowski – at Łęg, the Śrem, county, the Poznań Province).

The designer and user of the first original sprinkler irrigation machine was Mr Władysław Szczepkowski. The sprinkler irrigation machine constructed by Szczepkowski in 1911, after earlier a few-year attempts (at Łęg, the Śrem county, the Poznań Province) was the first sprinkler irrigation machine in Europe at such a large scale.

The sprinkler irrigation system developed by Szczepkowski found many followers in Germany, France, England and the USA. Szczepkowski's sprinkler irrigation machine also became the prototype for many later structures, e.g. today's rolling sprinklers.

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REFERENCES

- Baranowski F. (1919a). Zraszanie pól ornych. (Sprinkling irrigation of arable lands). Ziemiańin. Tygodnik Naukowo-Rolniczy i Ekonomiczny, CTG, Poznań, 17 August 1919, Issue 33, 130-131.
- Baranowski F. (1919b). Zraszanie pól ornych. (Sprinkling irrigation of arable lands). Ziemiańin. Tygodnik Naukowo-Rolniczy i Ekonomiczny, CTG, Poznań, 12 października 1919, Issue 41, 164-165.
- Biedrzycki S. (1912). Walka z suszą. (Struggle with drought). Druk „Gazety Rolniczej” (W. Musielewicz).
- Drupka S. (1972). Deszczownie i deszczowanie. (Sprinkler irrigation machines and sprinkler irrigation). PWRiL Warszawa.
- Dzieżyc J. (1974). Nawadnianie roślin. (Irrigation of crops). PWRiL Warszawa.
- Dzieżyc J. (1988). Rolnictwo w warunkach nawadniania. (Agriculture under conditions of irrigation). PWN Warszawa.
- Grabarczyk S. (1992). Stan i perspektywy deszczowania roślin w Polsce. (State and prospects of sprinkling irrigation of plants in Poland). Zesz. Nauk. ATR w Bydgoszczy 180, Rolnictwo 32, 7-14.
- Klawe R. (2001). Woda w rolnictwie. (Water in agriculture). Rocznik Muzeum Narodowego Rolnictwa w Szreniawie, v. 22, 117-122.
- Nowaczyk B. (1976). Deszczownie – projektowanie, wykonawstwo, eksploatacja. (Sprinkler irrigation machines – design, construction, operation). PWN Warszawa.
- Ostrómecki J. (1973). Podstawy melioracji nawadniających. (Basics of irrigation). PWN Warszawa.
- Peszek J., Żarski J. (1990). Historia i dorobek agrometeorologii w ośrodkach naukowych w Bydgoszczy. (The history and achievements of agrometeorology in the scientific institutions of Bydgoszcz). Zesz. Nauk. AR w Krakowie, Sesja Nauk. 27, 39-54.
- Rolbiecki S. (2013). O deszczowni Szczepkowskiego – 100 lat deszczowania roślin w regionie wielkopolsko-kujawskim. (About the sprinkler irrigation machine of Szczepkowski – 100 years of sprinkling irrigation of plants in the Wielkopolska-Kujawy region). XX Jubileuszowe Sympozjum Nawadniania Roślin, Materiały konferencyjne, Bydgoszcz – Tleń, 19-21 June 2013, 20-25.
- Różański A. (1926). Technika melioracyjna. Deszczownie. (Reclamation technology. Sprinkler irrigation machines). Przegląd Techniczny Issue 20-21, Volume LXIV, 328-329.
- Szmidt Z. (2001). Atrakcje turystyczne ziemi śremskiej. (Tourist attractions of the Śrem land). Śrem: Śremski Ośrodek Wspierania Małej Przedsiębiorczości, 18-19.
- Szmidt Z. (2010). Powiat Śremski, przewodnik turystyczny. (Śrem District, tourist guide). Śrem: Unia Gospodarcza Regionu Śremskiego – ŚOWMP, 25-29.

Zakaszewski C. (1956). Melioracje rolne. (Agricultural meliorations). Volume II. Nawadnianie. PWRiL Warszawa.

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