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Activities of Professor Tomasz Rylski (1838–1924) in the birth and development of tests of agricultural machines in the second half of the 19th century

***Abstract.** The aim of the study is a comprehensive assessment of the activity, scientific and creative achievements of Professor Tomasz Nikodem Ścibor-Rylski in the development of the field of testing agricultural machines in the second half of the 19th century. To achieve the aim of the study, the principles of historicism, scientificity and objectivity of coverage of historical phenomena and events were used based on the application of the historical-scientific method, methods of analysis and generalization. For the first time, a number of archival documents were introduced into scientific circulation, which shed light on the scientist's activities in the field of testing agricultural machines. In the article, based on archival data, the available creative work of the scientist, the main stages of his activity in the issue of the origin and formation of tests of agricultural machines and tools are updated. The activities of Professor T. Rylski contributed to the birth of the scientific foundations of agricultural tests, the formation of the principles of rational use of agricultural equipment by farmers of the Austro-Hungarian Empire. The professor's long-term participation in various agricultural exhibitions and competitions led to the laying of the foundations for the creation of the first agricultural testing station in Dublyany on the territory of western Ukraine. Justifying the need to create a test station, T. Rylski relies on the importance of the transition from the "exhibition" method of testing agricultural machines to testing at specialized stations. The scientist believed that it is the scientific approach to testing that will contribute to increasing the efficiency of the use of agricultural equipment and reducing errors during its operation. The formation of the Dublyany Higher Agricultural School, as a powerful scientific and testing center on the territory of modern Ukraine and Poland, is connected with the scientist's name. The creative heritage of T. Rylski indicates his invaluable contribution to the emergence of the scientific foundations of agricultural equipment testing. Therefore, it is precisely the absence of a special comprehensive study of scientific, creative and organizational activity of a scientist in the historiography of science and technology that determines the relevance of this study.*



Keywords: *Tomasz Rylski, testing of agricultural machines; testing station of agricultural machines and tools; analysis of the structure of agricultural tools; agricultural industry; exhibitions of agricultural machines*

Introduction.

The problem of testing agricultural machines has always been in the field of view of researchers and scientists. This is especially relevant for the period of formation of this branch of agricultural science. A prominent figure here is the professor of the *Dublyany* Higher Agricultural School – Tomas Rylski (Fig. 1). The relevance of the selected research topic is determined by the "white spots" in the historiography of science and technology, which relate to the professor's testing activities. The need to conduct the most complete and independent analysis of the scientist's contribution to the origin and development of tests of agricultural machines in the second half of the 19th century.



Figure 1. Professor of the *Dublyany* Higher Agricultural School Tomas Nikodem Scibor-Rylski (photo by S. Bizanskyi, 1882).

In the second half of the 19th century, quite a few researchers devoted their works to the issue of testing agricultural machines. In particular, Yu. O. Sokolovych-Altunina devoted her own research to determining the place of the *Dublyan* agricultural school in the development and establishment of agricultural science and research in Galicia (Sokolovych-Altunina, 2010).

T. B. Kharyk reveals the problems of the formation of agricultural research in Eastern Galicia in the middle of the 19th and early 20th centuries. on the example of the Dublin Agricultural School (Kharyk, 2016).

Equally important is the work of O. O. Visyn (2021), which examines the development of the trial case in Galicia at the turn of the 19th and 20th centuries. The author describes in detail the stages of development of agricultural machinery tests at the Dublyany agricultural school, partially paying attention to the contribution of Professor T. Rylski to the process of establishing the test station in Dublyany. She notes that "participation in agricultural machine competitions at many International Agricultural Machinery Exhibitions gave Professor Rylski an opportunity to familiarize himself with European achievements. That's why he was the first initiator of the creation of the first in the region of Dublyany experimental station of agricultural machines, where it would be possible to assess the quality and forecast the needs of agricultural machinery".

The creative path and activities of the scientist are fragmentarily covered in the works of Yuriy Tokarskyi "Engineering and technical studios in Dublyany" (Tokarskyi, 2008), "Professors, associate professors and assistants of educational and scientific institutions in Dublyany (1856–1947)" (Tokarskyi, 2004), "Dublyany: History of Agrarian Studies (1856–1946)" (Tokarskyi, 1996). Tadeusz Woskowski wrote about T. Rylski as the founder of the mechanics of agricultural work in Dublyany in his work "Dzieje studiów rolniczo-lasowych w ośrodku lwowsko-dublańskich w opracowaniu Tadeusza Wośkowskiego" (Woskowski, 2011). Lyubov Pynda in the work "Agroengineering research in the Dublyany Scientific Center of the end XIX – beginning XX" (Pynda, 2020) conducted an analysis of T. Rylski's work "Podręcznik mechaniki rolniczej dla gospodarzy praktycznych: wybrak i użycze żyęty i machin rolniczych" (Rylski, 1877). The achievements of Professor T. Rylski in the development of agricultural mechanics are highlighted in the work of Mykhailo Klymenko "Contribution of Professor Tomas Rylski (1838–1924) to the development of agricultural mechanics in the second half of the 19th century" (Klymenko, 2022).

In the modern history of science and technology, extremely little attention has been paid to the figure of Professor T. Rylski. For the first time, the scientist's biography was published in the 33rd volume of the "Polski Słownik Biograficzny" (Markiewicz, 1992). It is worth noting that there are quite a lot of "white spots" in this work, in particular, those related to the place and date of birth of the scientist, information about T. Rylski's parents, and his bibliography.

A small mention of the activity of the professor at the Dublyany Higher Agricultural School is present in the work "Przegląd tygodniowy (1866–1876), teksty, analizy, komentarze", which was published under the editorship of A. Janicka (Janicka, 2019, p. 156). In the work of F. Kucharzewski "Piśmenstwo techniczne polskie" there is some biographical information about Professor T. Rylski, which, however, does not give a general idea of the scientist's life and creative path. It is stated in the work that during the preparation of the publication for printing, the publication "Assembly

machine, its history, design and use. A guide for technicians and farmers" authors Marczewski, Strzelecki and Pietraszek use scientific articles by T. Rylski, when analyzing the structure of harvesters and harvesting machines (Kucharzewski, 1921, pp. 397–398). In addition, a fragmentary bibliography of T. Rylski is mentioned in the work "Bibliografia Polska: XIX. stólcia dopętsenia (P–Ż), Volume 7" (Estreicher, 1882, pp. 105–106).

One of the contemporaries of Professor S. Surzycki in the work "Die landwirtschaftliche Betriebsmittel in ihrem Einflusse auf den Zustand und die Entwicklung des Grossgrundbesitzes, sowie der Bauernwirtschaften in Galizien" presents T. Rylski's conclusions about the errors of plow operation, using the scientist's direct language (Surzycki, 1896).

In his own work, K. Bartoszewicz talks about T. Rylski's speech at the celebration of the anniversary of the constitution, which gives an idea of the scientist as a person with deeply patriotic views, who loyally respects and supports his own Motherland (Bartoszewicz, 1891, p. 173). About T. Rylski as a popularizer of agricultural knowledge, O. Leixner notes in his work (Leixner, 1895, p. 525). In "Rolnik: czasopismo dla gospodarzy wiejskich", the editors of the newspaper note that at the exhibition of agricultural machines in Przemyśl, T. Rylski gave a very simple and accurate method of evaluating machines (Rolnik, 1870).

Analyzing the above sources, we can come to the conclusion that the contribution of Professor T. Rylski to the practical study and research of agricultural machines is not covered enough and needs to be revised.

The aim of research is to conduct an analysis of scientific and practical activities and the contribution of Professor Tomasz Rylski to the testing of agricultural machines and equipment. Determining the place and role of this figure in establishing the practical foundations of testing agricultural machines.

Research Methods.

The methodological component of this study includes the principles of historicism, scientificity, and objectivity in covering the events of the past, which are based on the application of the historical-scientific method, methods of analysis, and generalization. An important component of this research is the use of research methods: general scientific, interdisciplinary, problem-chronological, comparative-historical.

Results and Discussions.

The beginning of the trial activity of Professor T. Rylski can be considered with certainty on September 12, 1868, when, by the decision of the Committee of the Economic Society (Rolnik, 1868), he was appointed to a permanent position at the Dublin school. Since the field of scientific interests of the scientist was, in particular, issues of mechanization of agricultural work, Tomasz Rylski begins painstaking work on studying the mechanical features of agricultural machines.

In July 1869, Professor T. Rylski published his own report in the newspaper "Rolnik" (Rylski, 1869) about his visit to the technical department at the agricultural and industrial exhibition in Krakow. The scientist writes that this exhibition cannot be called "epochal", although it presented some novelties of agricultural machines. Forming the report, the author divides the equipment presented at the exhibition by types of work performed and purpose.

Evaluating the presented plows, T. Rylski pays special attention to "Camecner-Vereirispflüge" – a full-metal wheelless plow presented by Werner from Javornik (Silesia), noting that in general the product is not bad, but has a serious drawback. It consists in the fact that half of the wall is deflected from the end of the blade to the right. This creates a shoe on the plow, which leads to the device twisting during plowing and its jumping out of the furrow. At the same time, another reversible plow of the same manufacturer is much better to use. Also, the professor did not ignore the English and American models of plows, praising them highly. Regarding Polish plows, the author was much more critical, emphasizing some of the shortcomings of their design, in particular, regarding too short rakes, which makes it difficult to adjust the depth and width of the furrow. Although at the same time, T. Rylski states that the price of domestic plows is quite "democratic", and they deserve to be distributed in the country. At the exhibition, various types of cultivators and harrows were presented, the author does not dwell on them in detail, while noting that he cannot properly assess their advantages and disadvantages due to the insufficient amount of test data.

The professor presents a detailed analysis of the design features of planters. A special place in the report was given to the analysis of the design of the "Cegielski" planter. The author considers its system to be the best, as it is designed on telescopic tubes. The professor considers such planters more practical than with rubber tubes or Garetto funnels. As the author noted, other planters were equipped with the "Victoria-Drill" spoon system and Garetto types of funnels. "Zimmerman" planters were distinguished by a tool for adjusting the shaft for changing the sowing rate, but T. Rylski believes that this design will be too difficult to operate. Also, interesting is the fact that a large number of planters were so heavily painted that even the gears are covered with varnish. The author believes that this was done in order to hide the low quality of the equipment. One of the novelties was a four-row beet harvester, the idea of creating which, as the author notes, is not bad. But since this planter had as many as twelve wheels, its operation will cause certain difficulties.

Next, the scientist gives a description of the design of the newly presented harvesters, describing their advantages and disadvantages. The professor especially "got" their manufacturers, because they gave the teeth an irregular shape, which, as he believed, is a significant obstacle for the widespread use of such reapers in practice. Criticism of manufacturers of potato diggers who did not conduct proper tests of their equipment is presented. A description of combined steam mills, forage harvesters, threshers was carried out. The scientist notes that domestic manufacturers are not making progress in some issues of thresher manufacturing, especially the number of

revolutions of the drum. In turn, when threshers of newer English, French and German designs have from 800 to 1000 drum revolutions per minute, domestic ones barely produce from 536 to 600 drum revolutions per minute. To T. Rylski's remark to the producers, he was answered that when the speed of rotation increases, the grain breaks, and in order to prevent this from happening, it is possible to change the structure of the chains and concavities of the drum. Tomasz Rylski believes that in this case it is worth using the Clayton-Szuttleworth drum design, which would reduce the percentage of lost grain. From this we can conclude that the professor had deep knowledge about the design features of agricultural equipment. During the exhibition, he gives clear recommendations to manufacturers to improve the structure of threshers.

It will not be superfluous to say that in this report, Professor T. Rylski lays the scientific foundations for testing agricultural machines. At the end of the report, the scientist makes several important comments on the testing methodology. The professor admits that the testing of agricultural machines, if carried out carefully and with knowledge of the matter, can bring great benefits to agriculture. T. Rylski undertook to promote the spread of high-quality agricultural tools and the exclusion of unnecessary ones, because he believed that in this regard the farming community was "wandering" without any guidance. The scientist constructively criticizes the tests made at the exhibition in Krakow. The tests conducted there could not convince anyone of the quality of this or that tool, as they were conducted with significant violations of the procedure. It is emphasized that the exhibition committee did not test the harvesters, which, according to the professor, will have a very negative impact on the agriculture of Galicia. Since every year there is a growing shortage of workers during the harvest, and the only way out of the situation is to use machines. By purchasing untested or unusable agricultural machinery, farmers will experience a significant reduction in productivity. Also, as the scientist notes, thresher tests were organized by manufacturers arbitrarily and did not provide any grounds for a fair evaluation of the equipment.

As for the tests of plows, T. Rylski does not single out anything better here. The author notes that a clear procedure must be followed: division of plows into classes, assessment of the performance of each specific plow, assessment of the amount of expended forces, assessment of structural and technical performance. When conducting testing, it is not possible to test several instruments at the same time, because in this way the attention of the judging panel will be scattered and the assessment will be inaccurate.

The judging panel paid no attention to any of these points, they plowed with three plows at a time, one directly behind the other, so that the furrow of one plow was covered by the furrow of another. When one plow stopped, others stopped, so it was impossible to judge the quantity and quality of the work done. T. Rylski was very disappointed by the lack of a dynamometer at the tests.

Finally, as the author points out, there should be a field specially adapted to such tests. The field should be demarcated so that the audience does not greatly interfere

with the use of weapons. What was shocking was that the audience did the tests themselves. According to the methodology, the control of tools during tests should be entrusted to experienced people, but the same ones, and by no means representatives of manufacturers. It is emphasized that tests conducted with violations do not bring any benefit, neither to producers, nor to farmers.

From July 2 to 5, 1870, Professor Tomasz Rylski visited an agricultural exhibition in the city of Rzeszów (now the territory of Poland). One of the features of this exhibition was the extremely low number of presented exhibits and equipment, which is explained by the lack of exhibition space. In the February issue of the newspaper "Rolnik" for 1871, the professor publishes a report on this visit (Rylski, 1871). As the author points out, the largest collection of machines was exhibited by the "Peterseim" company from Krakow, whose products show that their production is on the rise. At the same time, the professor criticizes the mechanical features of their products. The scientist provides recommendations for improving the design of the equipment – when the thresher is unfolded, the transmission of movement energy from the drive is not carried out correctly, which leads to the fact that the rod of the horse drive makes too few revolutions per minute. In order to get the required drum rotation speed, it was necessary to install non-proportional pulleys so that the pulley on the horse drive rod was larger and the pulley on the drum shaft was smaller. Also, the scientist points to a too tight drum belt, which creates unnecessary additional resistance.

Forage harvesters of the "Peterseim" company also, from the scientist's point of view, needed refinement, because they had a drive wheel with concave knives, which did not ensure high-quality cutting of the tops. T. Rylski devoted part of the report to the analysis of the design of the "Ceres" harvester, and also provided recommendations for its improvement. The author noted that this harvester is multifunctional. Its main feature was the correct placement of the front headstock on the extension of the axis of the running wheel and a good distribution of the machine's weight. According to the report, the harvester weighed only 8.5 tons. (about 425 kg). T. Rylski expresses significant comments regarding its design. The use of a cast-iron rudder and rake has been criticized, as it does not provide sufficient wear resistance during long-term use. Possible damage will entail significant difficulties in repair and costs for replacing components. Also, the features of the milling cutter, which is significantly moved forward, are emphasized.

In addition, the professor provided recommendations to some manufacturers in the report. "Eliaszewicza" dyers are recommended to focus on the production of threshers, because they are the best. Both the state and the enterprise would benefit from this. Plows for wrapping, plows with a cylindrical blade of the company "Jodłowa" are rated very low, the author considers them only initial attempts to create such machines. T. Rylski considers the "Mogilańskie" plows to be good, but expresses a desire to make small corrections to the design, for example, the screws in the cover wall should be recessed, it is recommended to lighten the frame and pay attention to the strength of the joints.

Paying attention to the English rake "Howarda", T. Rylski did not pass by the criticism of the national manufacturer, believing that domestic factories produce not enough rakes, strive only for lightness and cheapness, therefore they make them of too low quality. The iron wheels used are the most subject to wear, and being quite thin, they bend when the car is turned, the wrought iron teeth not being as wear-resistant as the steel ones.

In the January issue of the newspaper "Rolnik" from 1873, a report by Professor Tomasz Rylski on the trials of reapers, which took place between July 31 and August 2, 1872, in Gostyvice near Prague (Czech Republic) was published (Rylski, 1873a).

Covering this event, T. Rylski pointed out that there were so many farmers and other interested persons that separate trains had to be sent to transport visitors from Prague. 28 machines were applied for the competition, of which six were not admitted due to late arrival, one, as the property of the ministry, was not submitted for awarding, another six were not provided for testing at all. 9 American, 4 English and 2 German machines were tested. Only one of them was declared exclusively for horse harness, the others for draft horses or oxen. In the process of testing, horse teams performed work on one-hectare plots, and with ox teams – on one and a half hectares. In addition, the professor talks about the weather conditions, notes the high methodical level of conducting the tests, describes in detail the method of conducting and the conditions for determining the winners. At the same time, the professor expresses certain doubts about some of the conditions of the event. In particular, he does not agree with the fact that the cheapness of the car (along with other attributes) is counted as an unconditional advantage, although this should take place only under certain conditions and have clearly defined limits. Neglecting this important aspect can lead to abuse, since the cost of the equipment is set exclusively by the manufacturers, and can be revised at any time. In addition, the professor points to the absence of a dynamometer during the tests and the haste during their conduct, since 4 cars were tested in one pass, which distracted the jury's attention. Next, the author provides his own assessment of the presented harvesters, analyzing their structure, identifying the disadvantages and advantages of specific specimens. The scientist speaks positively about the "Royal" harvesters, which are imitations of new models of American harvesters. He is impressed with the lubrication devices of the new design harvester, which he thinks should be very practical to use, if they contain enough oil for 3 hours of work.

T. Rylski focuses on one more development – the harvester of the M. Hofherra system, which is an analogue of the English harvester. The professor notes that when he was present at the assembly of this machine, he discovered that the manufacturer assembled it using only a wrench. The improvements that this company made to the original design are very practical, combining the advantages of the original design and the maximum correction of its shortcomings.

An exhibition in the city of Vienna (the capital of the then Austro-Hungarian Empire, now Austria) became a significant milestone in the process of scientific development of agricultural machinery testing. Professor Tomash Rylski could not

ignore her either. Believing that progress in the field of mechanics can be used as a scale by which it is possible to judge the general level of civilization of peoples, T. Rylski after visiting this exhibition publishes a large-scale report in the newspaper "Rolnik". This work appeared in two issues of the publication for November and December 1873 (Rylski, 1873b; Rylski, 1873c).

Although the exhibition was not a trial, in the strict sense of the word, it presented many completely new models of agricultural equipment. As the professor points out, earlier, when machines were almost not used in agriculture, with all inventions, before they could become widespread, it was necessary to conduct a whole series of tests. The means for their implementation were almost exclusively exhibitions. Today, at least in civilized countries, such problems practically do not occur, since the spread of specialized test stations has begun. A manufacturer seeking to distribute his invention or improvement has ways of conducting this trial much more quickly without waiting for an exhibition. And the progressive farmer no longer waits for the exhibition, but makes the right choice based on the evaluation of the experimental station or the results of competitive tests. Thus, Professor T. Rylski expresses the opinion that the future of tests of agricultural machines lies only in the plane of their proper and strictly scientific evaluation. Conducting such an assessment should be carried out only at competitions (for each type of machine separately) or at experimental stations.

Touching directly on the holding of the exhibition itself, Tomasz Rylski divided his report into sections, according to the represented producing countries. The English pavilion was characterized by a huge amount of exhibited equipment. In particular, the professor gives a description of the design of the steam-powered plows presented there, gives a description of the design features of steam threshers, determining the advantages of their use. The author focuses the reader's attention on the high quality of "Howarda" rakes, recognizing the prospects and advantages of its use, and presents the method of its use. The author, having noticed the new harvester of the company "Hornsby" called "Advance", was pleasantly surprised by the new approaches to its design. A special feature is that the movable hinged rake of the harvester is placed on fixed rods and can be used turned by 90°. The operator, using an angle lever, can move them in any direction. With a free inclination of the rake, the teeth take a position parallel to the table and the rake does not lower, but only tilts the grain stalks. Among the relative advantages of this harvester, the author attributes the combination of a crank and a knife saw. Although here it is worth noting that the professor does not completely agree with the design of the transmission device. In particular, he notes that the main and gear shaft of the transmission device, which are at an angle, cause significant friction and quickly wear out the bearings. In addition, the professor analyzes machines for planting potatoes and planters, but does not indicate anything remarkable, writing that additional tests are needed for analysis.

T. Rylski notes the magnificence of the American pavilion, a large part of which is occupied by reapers. American manufacturers made a significant contribution to the spread and improvement of agricultural machinery, although there was not a variety of

equipment presented at the exhibition, and most of the harvesters available were already well known. The professor pays more attention to the comparison of the characteristics of English and American models, notes that English cars are much heavier than American ones. In the process of writing the report, he ponders the reasons for this phenomenon, suggesting that it has to do with the use of different materials for the construction of the machines and the more filigree work of American manufacturers. Although he emphasizes the fact that often reducing the weight of the mechanism leads to a decrease in its wear resistance, which in his case can lead to problems with breakdowns, especially with national soil characteristics. In the future, the author notes the originality of the design of the harvesters "Aultman, Milleret Comp." and "Locke's Harvester" and compares them with each other. In addition, the professor conducted an in-depth analysis of the newly presented dynamometers.

The scientist was somewhat disappointed after visiting the Austro-Hungarian pavilion. T. Rylski pointed to a deep stagnation in the production of agricultural machines in Austria-Hungary. He emphasized the need to improve the quality of machines to the level of foreign countries, the lack of flexibility in doing business, as well as the failure to meet delivery deadlines. Being a sincere patriot of his country, T. Rylski found it difficult to observe the absence of Polish manufacturers at the well-known international exhibition. The reason for this, the professor cites the inability of many factories to withstand competition with first-class products, for example, English production. Nevertheless, the author singled out several products of the Austrian manufacturers "Claytonet Shuttleworth" and "M. Hofherr", highlighting generally good production quality and decent test results of their machines. A collection of plows was also presented, which immediately won the attention of farmers. T. Rylski points out that many of them are manufactured at the proper level, and the cost is affordable for the average Polish farmer.

A special place in the scientist's report was awarded to the German pavilion. The author accompanied the description of the presented agricultural machines with several drawings to better explain their design features. It is determined that the main aspiration of German manufacturers is to maintain a level of quality in the manufacture of machines that English products would not be able to withstand. Professor T. Rylski notes the significant progress of German mechanical engineering since the last similar exhibition in Paris, but the technical level of the proposed machines, in his opinion, leaves much to be desired. The author carefully analyzes the construction of agricultural machines, presents, in his characteristic manner, the advantages and disadvantages. Fertilizer machines shown at the exhibition were criticized by the professor due to the impracticality of the proposed design. The professor's attention was drawn to the "Weil" threshers from Frankfurt, which are characterized by low cost and lightness, but have a rather weak structural performance. T. Rylski made an interesting remark about the threshing device. The handle system used with both these and many other German-made threshers was specified by the manufacturers as an entirely new development. Although in fact it was already used in Europe more than

20 years ago and many people refuse it. The manual system does not provide any advantages, on the contrary, it creates many inconveniences in practical use.

The scientist did not ignore the products of some other countries. "Cichocki" plows are characterized by a good design. These plows, if well made, deserve rapid adoption among the farming community, especially this manufacturer's double hull plows. Other specimens presented at the exhibition, according to the professor, only prove that in some countries, for example, Russia, Italy, agricultural mechanics is still in its infancy.

In the period of the 70s of the 19th century in the Dubliany Higher Agricultural School, serious scientific research and testing of agricultural machines began, although fully adapted to practical requirements from the point of view of theory (Surzycki, 1928). This was largely made possible thanks to the activities of Professor T. Rylski, his experience and the newest approach to the issue of studying construction, practical features of the use of agricultural machines and tools.

The establishment of a test experimental station of agricultural machines was a kind of turning point in the activity of the Dublyany research center. The first mention of this station dates back to July 1874, when the newspaper "Rolnik" published an announcement about the start of its operations (Rolnik, 1874). It can be assumed that this was one of the first such testing stations in Ukraine. Professor T. Rylski took the most active part in its creation and activity. In September 1874, the professor submitted his own article to the newspaper "Rolnik" with reasons for the need to create and operate such a station (Rylski, 1874). T. Rylski believed that agriculture is changing, as opposed to manual peasant labor, machines are coming that are driven by the power of animals, steam, etc. In this connection, there is an urgent need to form a strictly scientific approach to the issue of choosing agricultural machines and tools. More than once, the professor, with his works, draws the attention of farmers to the fact that the useful use of agricultural machinery depends on the appropriate reasoned choice and correct use. T. Rylski points out that currently in Poland, farmers who need to buy agricultural machinery rely either on their own knowledge and experience when choosing, or try to find out the advantages and disadvantages of using one or another technique by trial and error. Or, in the best case, use the test protocols conducted by the manufacturers themselves for selection. These considerations, which are guided by the choice of machines, very often become the cause of painful disappointments and material losses, which, in turn, slow down the development of agriculture. And therefore it is easy to understand that the choice made on this basis is at least risky. The same applies to the option when tools are chosen on the recommendation of friends, colleagues. After all, according to the professor, in such a situation it is necessary to remember – "what is good for one person is not always good for another". Also, in the article, the scientist talks about the existing methods of testing agricultural machines at agricultural exhibitions, competitions and research stations.

Without rejecting the advantages of any of the test models, T. Rylski was convinced that the tests conducted by research stations are the best and most

informative. It is not enough for a farmer to know that this tool or machine is the best among a number of others. For practical use, the farmer must know the value of each machine, each design separately, and that this design is professionally evaluated from a technical and agricultural point of view. He must be absolutely sure of the advantages of using the technique in his own natural conditions. In addition to the above purpose, the testing station is important for detecting errors in the manufacture, design and use of machinery, both mechanically and agriculturally, taking into account the national needs in the broadest sense, so as to draw the attention of the producers to the needs of the peasants. The aim of the experimental test station is to create a kind of intermediary body between producers and farmers, which could provide expert advice to both parties.

The station operated successfully until at least 1879, having conducted many experimental tests of the equipment. During this period, ten reports on its activities were issued (Rylski, 1879), three of them were issued by T. Rylski, which indicates his direct participation in its functioning. Although this does not negate the fact that the station later collapsed due to low subsidies (Markiewicz, 1992).

In 1882, the scientist wrote a paper on plow tests in Lundenburg (London, Great Britain) (Rylski, 1882). In his work, T. Rylski expresses the opinion that the test as a whole passed at a decent level. But at the same time, the professor expresses serious reservations about the methodology of the tests, which, as he believed, led to the distortion of the results. There were mainly two mistakes: there was not enough time to test such a large number of agricultural tools and machines, and the division of plots for cultivation was not done correctly. The test field was divided into plots of 30 acres each, then the plots were divided between the tested plows with very different types of soil, some with heavy clay soil, others with light sandy soil. This circumstance clearly affected not only the accuracy of the results of the tests themselves, but also to a large extent the amount of mechanical work performed. Also, an equally important role was played by the fact that the tests were conducted not only during the day, but also at night under artificial lighting. In addition, the scientist, in his characteristic manner, described changes in the design of plows, worked out possible features of their practical application.

In the same year, T. Rylski presented an oral report on the exhibition in Przemyśl (Rolnik, 1882) at the meeting of the Galician Economic Society. To the remarks of some participants of the meeting about certain inaccuracies, Tomasz Rylski replied that during the entire exhibition he was also busy with the work of the panel of judges. This once again confirms the high professionalism of the scientist and the demand for his professional assessments.

The year 1886 in terms of testing activities was marked for the scientist by visiting an exhibition in Chernivtsi, where both already known models of agricultural machines and new fans for grain cleaning were presented (Rylski, 1886). In his report based on the results of this event, T. Rylski provides a professional analysis of the structure of horse-powered threshers and rakes. The professor was particularly interested in the

design of a single-horse chain drive, presented by K. Drossier (manufacturer from Novy Jichyn, Czech Republic). The scientist considers it not efficient enough, because the number of revolutions (about 600) of the drive disk is too small for the thresher. However, T. Rylski notes the extremely low cost of the specified structure – only 600 zlotys. In addition, the scientist touches the newly presented steam plows, evaluates changes in their design, determines the expediency and effectiveness of the changes made.

Another, no less important, stage in Tomasz Rylski's testing activity was his many years of work as a judge at exhibitions and competitions of agricultural machines. In 1876, Professor T. Rylski was appointed a member of the commission for checking and testing the device for knitting sheaves, which was presented by Erasm Zablotyski (Rolnik, 1876). 1888 – T. Rylski was the head of the panel of judges for the assessment of agricultural machines and tools, which took place within the framework of the fifth general meeting of members of agricultural circles (Rolnik, 1888). 1894 – the scientist received a written thank you from the committee of the Galician Economic Society for participating in the national agricultural exhibition in Lviv (Rolnik, 1894). In 1900, thanks to the efforts of the professor, a competition of harvesters was organized on July 25–26, here T. Rylski was the secretary of the panel of judges (Rolnik, 1900). 1901 – panel judge at an exhibition-trial of agricultural machinery and tools for growing sugar beets in Przewodsk (Poland) (Rolnik, 1901).

A detailed analysis of the testing activities of Professor Tomasz Rylski makes it possible to assess his contribution to the development of agricultural mechanical engineering. We have established that the historiography of T. Rylski's work in the context of the development of agricultural equipment testing is represented by a number of publications. However, these works illuminate the professor's activities superficially and fragmentarily, thereby leveling the role of the scientist in the birth and development of agricultural research.

Summarizing the above, we can say with confidence that T. Rylski made an invaluable contribution to the problem of testing agricultural machines. His judging activity at many competitions, exhibitions and tests contributed to the improvement of the quality of manufactured agricultural machines and tools. Hard work and lobbying of the scientist led to the creation of the first agricultural research station in the region, which became a signpost for farmers and manufacturers of agricultural equipment. T. Rylski's visit to many national and international exhibitions contributed to the formation of a powerful scientific, research and mechanization center in Dublyany. Publication of reports by scientists on attended events helped popularize the mechanization of field work, spread new inventions and achievements of rural engineering.

Conclusions.

In this review article, based on the principle of historicism, objectivity, and scientificity, we attempted to conduct a comprehensive analysis of the contribution of

Tomasz Rylski, professor of the Dublyany Higher Agricultural School, to the issue of the origin and development of testing agricultural machines in the second half of the 19th century. This made it possible to determine the place and role of the figure of T. Rylski in establishing the foundations of the practical use of agricultural machines and equipment. In addition, the article analyzes the professor's contribution to the creation of the first agricultural machinery and equipment testing station in Dublyany on the territory of modern Ukraine. Taking into account the fact that the vast majority of researchers ignore the scientific and creative heritage of T. Rylski, the results of this study "shed light" on the activities of the scientist, who played one of the leading roles in the formation of scientifically based use of technical means for agricultural production. The conducted analysis confirms the significance of the creative achievements of Professor T. Rylski, as one of the founders of agricultural mechanics in Ukraine and Poland, which had a significant impact on the understanding of the stages of development of agricultural research in general and agricultural mechanics in particular.

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Діяльність професора Томаша Рильського (1838–1924) у зародженні та розвитку випробувань землеробських машин другої половини XIX ст.

Анотація. Метою дослідження є комплексна оцінка діяльності, наукових та творчих звитяг професора Томаша Сцібора-Рильського (польською мовою *Tomasz Nikodem Ścibor-Rylski*) у розвитку справи випробувань землеробських машин у другій половині XIX століття. Для досягнення поставленої мети дослідження використано принципи історизму, науковості та об'єктивності висвітлення історичних явищ та подій на основі застосування історико-наукового методу, методів аналізу та узагальнення. До наукового обігу уперше введено ряд архівних документів, котрі проливають світло на діяльність вченого у галузі випробувань землеробських машин. У статті на основі архівних даних, наявного творчого доробку вченого актуалізовано основні етапи його діяльності у питанні зародження та становлення випробувань землеробських машин і знарядь. Діяльність професора Т. Рильського сприяла зародженню наукових основ землеробських випробувань, формуванню принципів раціонального використання сільськогосподарського устаткування фермерами Австро-Угорської імперії. Багаторічна участь професора у різноманітних сільськогосподарських виставках та конкурсах призвела до закладення основ для створення першої на території західної України сільськогосподарської випробувальної станції у Дублянах. Обґрунтовуючи необхідність створення випробувальної станції Т. Рильський спирається на важливість переходу від «виставкового» способу випробування землеробських машин до випробування на спеціалізованих станціях. Вчений вважав, що саме науковий підхід до випробувань сприятиме підвищенню ефективності використання землеробського устаткування, зменшенню помилок при його експлуатації. З іменем науковця пов'язане становлення Вищої рільничої школи у Дублянах, як потужного наукового та випробувального осередку на території сучасних України та Польщі. Творча спадщина Т. Рильського вказує на його неоціненний внесок у зародження наукових основ випробування землеробського обладнання.

Тому, саме відсутність спеціального комплексного дослідження наукової, творчої та організаційної діяльності вченого в історіографії науки і техніки зумовлює актуальність даного дослідження.

Ключові слова: *Томаш Рильський; випробування землеробських машин; випробувальна станція землеробських машин і знарядь; аналіз будови сільськогосподарських знарядь; сільськогосподарська промисловість; виставки сільськогосподарських машин*

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