

## THE RESULTS OF AN ACADEMIC EXERCISE OF USING AI AS AN TOOL FOR IDENTIFYING CERTAIN KEYWORDS IN USAMVB SCIENTIFIC ARTICLES

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### Abstract

*This article presents the results of an academic exercise aimed at selecting an AI-efficient working tool between AISA1 from TC1 and AISA2 from TC2 to identify LED's light, and plant keywords in scientific articles available on-line from publications of USAMV of Bucharest. Such a tool is necessary for students, teachers, and researchers who have scientific activity with implications in the use of LED's light to plants.*

*Each tool used three keyword search variants, namely: individual keywords, a succession of keywords, and an explicit request for identification (identifies in the scientific publications of USAMV of Bucharest the following keywords: LED's, light, and plants). The results obtained, for each of the three variants of keyword identification, indicate both the use of the AISA1 AI-based working tool from TC1 for quick identification of text-based information without identification by accurate academic citation of the source, as well as using the AISA2 AI-based tool from TC2 to quickly identify text information and sources as links that it must be accessed, studied and selected in established academic mode.*

*Both tools can provide information that through concatenation generates a basic image for the primary verification of the existence of LED's, light, and plant keywords, in scientific articles available on-line from publications of USAMV of Bucharest.*

**Key words:** artificial intelligence (AI), LED's, light, plants, scientific articles (issues).

### INTRODUCTION

The term Artificial Intelligence (AI), "is frequently applied to the project of developing systems endowed with the intellectual processes characteristic of humans, such as the ability to reason, discover meaning, generalize, or learn from past experience" (<https://www.britannica.com/technology/artificial-intelligence>).

AI is a part of computer science concentrated on creating systems capable of accomplishing tasks that typically require human intelligence (e.g., recognizing patterns, problem-solving, learning, understanding natural language, and making decisions). AI systems utilize algorithms and large data sets to identify patterns and make predictions or decisions without human intervention. There are various types of AI (AISA1, AISA2, etc.), ranging from narrow AI, designed for specific tasks, to general AI, which aims to understand and accomplish intellectual tasks that a human can

(e.g., customer support, programming, language translation, education, creative writing, personal assistant, etc.).

AISA1 is "an AI language model created by TC1, designed to understand and generate human-like text based on the input I receive" and It's "purpose is to assist with a wide range of tasks, including answering questions, providing information, offering writing help, and engaging in conversations" (Source: Conversation with AISA1. Accessed at 10.05.2024).

AISA2, created by TC2 is "an AI companion. It can provide information, answer questions, and engage in conversation" and it "can also help with creative writing tasks, such as editing, rewriting, improving, translating, and optimizing content" (Source: Conversation with AISA2. Accessed at 10.05.2024).

Artificial Intelligence (AI) is one of the tools that the student, teacher, and scientific researcher use to identify useful information in the work they carry out. But, although in recent

years, information obtained through AI is accessible to almost anyone and anytime, when the information must be at a didactic or/and scientific level, it requires the use of AI that is based on professional-level sources.

One of the professional-level scientific sources accessible on-line consists of scientific articles. The main types of scientific articles in the knowledge flow are reviews, research articles, and communications. However, the sources for these types of scientific articles are scientific publications made up both from volumes of scientific conferences and from specialized journals that publish using the peer-review system.

Amongst the scientific publications of the University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV of Bucharest), containing scientific articles available on-line there are seven collections of scientific conferences specific to each of the seven faculties and a specialized journal that publishes using the peer-review system (<https://agricultureforlife.usamv.ro/index.php/publications>).

The aforementioned seven collections of scientific conferences are: Scientific Papers. Series A. Agronomy, Scientific Papers. Series B. Horticulture, Scientific Papers. Series D. Animal Science, Scientific works. Series C. Veterinary Medicine, Scientific Papers. Series E. Land Reclamation, Earth Observation & Surveying, Environmental Engineering; Scientific Bulletin. Series F. Biotechnologies and Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development, and they contain scientific articles previously presented within the framework of the International Conference "Agriculture for Life, Life for Agriculture" (<https://agricultureforlife.usamv.ro/index.php/publications>). Additionally, the relevant magazine that publishes using the peer-review system (AgroLife Scientific Journal) covers scientific issues about every field of activity of every seven faculties of USAMV of Bucharest and has two editions every year (<https://agrolifejournal.usamv.ro/index.php/agrolife>). In 2015, the United Nations (ONU),

established as part of the 2030 Agenda for Sustainable Development, (<https://sdgs.un.org/2030agenda>), the 17 Sustainable Development Goals (e.g: end of hunger, achieve food security and improved nutrition and promote sustainable agriculture; sustainable cities and communities; clean/fresh water, etc.), in which contribute information from the scientific publications of USAMV of Bucharest (e.g.: Mitelut et al., 2022; Jerca et al., 2022; Chiselita et al., 2023; Drăghici et al., 2023; Geicu-Cristea et al., 2023; Lloha et al., 2023; Lelieveld, 2023; Vamanu & Dangnon, 2023; etc.). In this regard, an example of applying scientific information to support sustainable development is the use of LED's light to plants belonging to the following species: *Camelina sativa* L. (Podgoreanu et al., 2015); *Artemisia dracuncululus* L. (Enache & Livadariu, 2016); *Lycopersicum esculentum* L. (varieties Buzău 4C, Rio Grande ST and Saint Pierre ST) (Livadariu & Dumitru, 2019); *Lycopersicum esculentum* L. (varieties Sonia de Buzău, Hera and Coralina) (Dănăilă-Guidea et al., 2020); *Taxus baccata* L. (Delian et al., 2022).

Subsequently, given both the above-mentioned and the attention paid in recent years to the use of LED's light for plant growth and development, this paper has the following academic purpose: selecting an AI-powered tool to identify LED's, light, and plant keywords in scientific articles available on-line from publications of the USAMV of Bucharest. In order to reach this academic goal, we have designed an exercise using two AI types, one form TC1 (respectively, AISA1 = "Generative Pre-trained Transformer-based conversational AI") and one from TC2 (respectively, AISA2 = "an AI assistant developed by TC2").

Every working tool used three variants to identify LED's, light, and plants keywords from the scientific articles available on-line in the USAMV of Bucharest publications, as: individual keywords (LED's, light, or plants), sequence of keywords (LED's, light, and plants) and an explicit request for identification (identifies in the scientific publications of USAMV of Bucharest the following keywords: LED's, light and plants).

## MATERIALS AND METHODS

The working **materials** consisted of a Lenovo IdeaPad S145-15IIL laptop with Operating System: Windows 11 Pro, internet access, AISA1 access, and AISA2 access.

The working **method** involved creating an exercise using **two working tools**. Among these, one working tool was one model AI created by TC1 (respectively, AISA1 Version-3.5) and one assistant AI (Source: conversation with AISA2. Accessed at 10.05.2024) created by TC2 (respectively, AISA2).

Each of these working tools used three variants of sources identification through:

- V1 = individual keywords (LED's, light, or plants);
- V2 = sequence of keywords (LED's, light, and plants);
- V3 = an explicit request for identification (Identify the following keywords in the scientific publications of USAMV of Bucharest: LEDs, light, and plants).

**Variant V1 generated three assertions**, as it follows:

- V1Q1 = LED's in publications of University of Agronomic Sciences and Veterinary Medicine of Bucharest;
- V1Q2 = Light in publications of University of Agronomic Sciences and Veterinary Medicine of Bucharest;
- V1Q3 = Plants in publications of University of Agronomic Sciences and Veterinary Medicine of Bucharest.

**Variant V2 generated one assertion**, respectively:

- V2Q4 = LED's, light and plants in publications of University of Agronomic Sciences and Veterinary Medicine of Bucharest.

**Variant V3 generated an explicit request for identification**, respectively:

- V3Q5 = Identify LED's, light and plants in publications of University of Agronomic Sciences and Veterinary Medicine of Bucharest.

Each of the three variant of searching key words was realized in three iterations (V1, V2 and V3) (10 December 2023, 10 February 2024

and 10 May 2024). To elaborate the final form of the paper we used the 10 May 2024 iteration. The results obtained using AISA1 (according to the responses generated by AISA1, Version-3.5) and AISA2 (according to the responses generated by AISA2), have been noticed and assessed by comparison from the perspective of the established goal through the performed exercise.

## RESULTS AND DISCUSSIONS

Results obtained following the exercise to use AI to identify LED's, light and plants keywords in scientific articles on-line USAMV of Bucharest publications are displayed in two panels subsequent to the two working tools (AISA1 from TC1 and AISA2 from TC2). And, within the framework of each tool, the results are sub-grouped on three variants made up from individual keywords (V1Q1, V1Q2 and V1Q3), sequence of keywords (V2Q4) and an explicit request for identification (V3Q5).

**AISA1 from TC1. According to responses generated by AISA1, Version-3.5**

(Source: Conversation with Chat Generative Pre-trained Transformer from TC1. Accessed at 10.05.2024)

**V1Q1.** Response to the V1Q1 statement starts with the following sequence of text: "Finding specific references to LED's technology within publications from a particular institution can be challenging without access to their internal databases or repositories. However, I can provide some general information about how LED technology might be featured in research or publications from the University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV Bucharest)".

The response to this question provides information related to the current implications of LED's in: Greenhouse Technology, Animal Sciences, Energy Efficiency, and Aquaculture. The response ends with:

"To find specific publications, you may need to search through academic databases like PubMed, Google Scholar, or the university's own library catalogue. Additionally, reaching out to researchers or faculty members directly could provide insights into their current

projects and publications related to LED technology”.

**V1Q2.** Response to the statement V1Q2 starts with the following sequence of text: “Research related to light, including artificial lighting technologies like LEDs, can be found in various publications from the University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV Bucharest). Here are some areas where you might find such publications”.

Response provides information regarding current implications of the light in: Horticulture and Plant Sciences, Animal Welfare and Behaviour, Aquaculture, and Energy Efficiency and Environmental Sustainability.

The response end with a sequence of text which identically with the end of V1Q1, relates to the academic databases (PubMed, Google Scholar, or the university's own library catalogue), or contact faculty members directly.

The main difference between the final text from V1Q1 and V1Q2 is given by the reference to “... related to LED technology” compared to “... related to light and lighting technologies”.

**V1Q3.** Response to the statement V1Q3 starts with the following text: “Publications from the University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV Bucharest) cover a wide range of topics related to plants. Here are some areas where you might find publications related to plants”.

Response provides information regarding current implications of plants in: Crop Science and Agronomy, Horticulture and Floriculture, Plant Pathology and Plant Protection, Plant Biotechnology and Molecular Biology, and Environmental and Ecological Studies.

Essentially, this response is different to the responses from V1Q1 (Greenhouse Technology, Animal Sciences, Energy Efficiency, Aquaculture) and V1Q2 (Horticulture and Plant Sciences, Animal Welfare and Behaviour, Aquaculture, and Energy Efficiency and Environmental Sustainability). Therefore, one can notice a differentiation of responses according to the keyword used as relevant element within the statements in variant V1, respectively: LED's in V1Q1, light in V1Q2, or plants in V1Q3.

The response ends with a text that differs only in the final part (“... publications in plant

science”), from the final text in V1Q1 (“... publications related to LED technology”), and V1Q2 (“...publications related to light and lighting technologies”).

**V2Q4.** Response to the V2Q4 statement starts with the text: “Research at the University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV Bucharest) likely covers the intersection of LEDs, light, and plants across various disciplines such as agronomy, horticulture, plant physiology, and environmental science. Here's how these topics might converge in publications from USAMV Bucharest”.

Response provides information regarding current implications LED's, light and plants in: LED's in Plant Growth and Development, Light Quality and Quantity Effects on Crop Production, LED's for Sustainable Agriculture, LED's in Plant Stress Physiology, and Optimization of LED's Lighting.

This response is different from the responses from V1Q1, V1Q2 and V1Q3, which provided information from a broader area as it used only one key word. Basically, this response reduces the information search area to a narrower level and it is more applied on a certain information direction as it uses a sequence of keywords.

The response ends with a text which, unlike the correspondent text sequence from V1Q1, V1Q2 and V1Q3, provides additional, more customized suggestions, narrowing down to just three areas of search research, respectively “... Additionally, reaching out to researchers or faculty members in departments related to agronomy, horticulture, or plant physiology may provide insights into their current projects and publications related to LEDs, light, and plants”.

**V3Q5.** Response to the explicit identification request V3Q5 begins with the text: “To provide a detailed list of publications from the University of Agronomic Sciences and Veterinary Medicine of Bucharest (USAMV Bucharest) specifically focusing on LED's, light and plants, I would need access to their academic database or repository, which is not available to me. However, I can guide you on how to conduct a search to identify such publications”.

This response is different from the responses to the V1Q1, V1Q2, V1Q3 and V2Q4 statements,

as it highlights the presence of certain information that “is not available” for AISA1 from Open AI. But the answer provides information about how to search for information by exploring within:

- University Repository or Library Database;
- Academic Databases;
- Faculty Profiles and Research Websites;
- Conference Proceedings and Journals;
- Collaborative Projects and Networks.

The response ends with the following text “By employing these strategies and carefully selecting search terms related to LEDs, light, and plants, you can identify publications from USAMV Bucharest that focus on this topic. Additionally, contacting the university's library or relevant faculty members for assistance in accessing publications or obtaining further information can be beneficial”.

By guiding the identification of sources for accessing the desired information, it contributes to educating an inexperienced user in improving the documentation competence from scientific sources.

### **AISA2 from TC2. According to responses generated by AISA2**

**(Source: Conversation with AISA2. Accessed at 10.05.2024)**

**VIQ1.** Response to VIQ1 statement starts with the following text: “Here are some resources related to LED’s from the University of Agronomic Sciences and Veterinary Medicine of Bucharest”.

Response to VIQ1 statement provides information regarding sources to access USAMV of Bucharest publications:

- Scientific Journals with eight Journals (<https://www.usamv.ro/index.php/en/scientific-research/scientific-journal>);
- Agriculture for Life Conference Publications (<https://agricultureforlife.usamv.ro/>);
- Bulletin of University of Agricultural Sciences and Veterinary Medicine (<https://doaj.org/toc/1843-5378>).

The eight Scientific Journals are:

- Agrolife Journal;
- Agronomy Journal;
- Horticulture Journal;
- Animal Science Journal;
- Veterinary Medicine Journal;
- Land Reclamation Journal;

- Biotechnology Journal;

- Management Journal.

The sources mentioned in the response to the VIQ1 statement may contain scientific information about LED’s and links for direct access to the sources used. But the answer to question VIQ1 also contains additional sources, in addition to those already mentioned for this answer, namely: <https://www.usamv.ro/index.php/en/home-eng>; <https://www.timeshighereducation.com/world-university-rankings/university-agronomic-sciences-and-veterinary-medicine-bucharest>; <https://www.timeshighereducation.com/sites/default/files/university/rankings/721492-en.json> and

<https://agricultureforlife.usamv.ro/index.php/publications>.

The response ends with:

“Please note that while these resources provide valuable insights, they may not directly contain information about LED’s. For more specific publications, I recommend checking each journal’s archives or using their search function, if available”.

**VIQ2.** The answer to the statement VIQ2 begins with a text that differs from the similar text area from the statement VIQ1 only by replacing the word LED’s with “Light”.

The answer to the statement VIQ2 differs from the answer to the statement VIQ1 by explicitly mentioning only a number of just six Scientific Journals

(<https://www.usamv.ro/index.php/en/home-eng>). The Scientific Journals mentioned are:

- AgroLife Scientific Journal;
- Agronomy Scientific Papers;
- Horticulture Scientific Papers;
- Animal Science Scientific Papers;
- Veterinary Medicine Scientific works;
- Land Reclamation, Earth Observation & Surveying, Environmental Engineering Scientific Papers.

Assessing the results from VIQ1 and VIQ2 statements, it can be seen that besides the difference between the number of Scientific Journals there is also a difference even at the level of their titles. This highlights the active role that AISA2 has in selecting the number and type of sources that may contain useful information based on individual keyword-based search.

But, the number of suggested additional sources is lower, being only two instead of four. The two additional suggested sources are: <https://www.veterinarymedicinejournal.usamv.ro/> and <https://agricultureforlife.usamv.ro/index.php/publications>.

The response ends with a text that differs from the final text from the question V1Q1, only by replacing the word LED's with "Light".

**V1Q3.** Response to the V1Q3 statement begins with a text that differs from the similar text area from the statements V1Q1 and V1Q2 only by replacing the words LED's or "Light" with "Plants".

Response to the V1Q3 statement unlike the responses to the V1Q1 and V1Q2 statements brings information about two of the three sources of access to USAMV of Bucharest publications. The source which is no longer referred to is Bulletin of University of Agricultural Sciences and Veterinary Medicine (<https://doaj.org/toc/1843-5378>). Therefore, it is highlighted, once again the active role played by AISA2 in selecting sources that may contain useful information according to the search based on individual keywords. But, the number of suggested additional sources is lower, being only two instead of four. The two additional suggested sources are: <https://creativecommons.org/licenses/by/4.0%29> and <https://agricultureforlife.usamv.ro/index.php/publications>.

It can be noticed that one of the two additional sources is common to one of the additional sources mentioned in the response for the V1Q2 statement.

The response ends with a text that is different from the final text in V1Q1 and V1Q2 statements, only by replacing the words LED's and "Light" by "Plants".

**V2Q4.** Response to the V2Q4 statement begins with a text that differs from the similar text area from the V1Q1, V1Q2 and V1Q3 statements by replacing the individual words "LED's", V1Q3, "Light" and "Plants" with the sequence of words "LED's, light and plants".

Response to the V2Q4 statement unlike responses to the V1Q1, V1Q2 and V1Q3 statements no longer provide information about the sources of access to the publications

USAMV of Bucharest. Instead, it mentions specific information about two scientific articles, namely:

- "BIOCHEMICAL CHANGES, INDUCED BY LED LIGHT, IN TOMATO PLANTS, GROWN IN THE INTEGRATED MANAGEMENT SYSTEM (SMI) OF AGROECOSYSTEM RESISTANCE" (<https://agronomyjournal.usamv.ro/index.php/scientific-papers/past-issues?id=1284>) and

- "LED Technology Applied to Plant Development for Promoting the Accumulation of Bioactive Compounds: A Review" (<https://www.mdpi.com/2223-7747/12/5/1075>).

By explicitly stating the two scientific articles one can save search time. But the disadvantage is that one of the two scientific articles do not belong to a USAMV of Bucharest publication.

The number of additional sources proposed is similar to the number of sources proposed for V1Q2 and V1Q3. The additional sources proposed are: <https://www.mdpi.com/2073-4395/11/6/1106?src=444017> and <https://doi.org/10.3390/plants12051075>.

Similar to the answer itself, also in the response area with additional sources proposed, it is noticed that one of them is not from a publication of USAMV of Bucharest.

Response for V2Q4 statement ends with a text with two components that differ from the final text in V1Q1, V1Q2 and V1Q3 statement. The first component for V2Q4 statement consists in the stating that information "... while these publications provide valuable insights into the use of LED lighting in plant growth, they may not be directly affiliated with the University of Agronomic Sciences and Veterinary Medicine of Bucharest", but for V1Q1, V1Q2 and V1Q3 consists in the stating that information "... while these resources provide valuable insights, they may not directly contain information about LED's".

The second component for V2Q4 statement consists in stating that ("... I recommend checking their official website or academic databases"). This mention differs from that for V1Q1, V1Q2, and V1Q3 statements ("... I recommend checking each journal's archives or using their search function, if available").

Assessing the final response areas for V1Q1, V1Q2, V1Q3, and V2Q4 statements, the conclusion is that statements using only one keyword compared to the statement that used a keyword sequence generated more accuracy in identifying publications of USAMV of Bucharest. It can also be noted that only through the V2Q4 statement was explicitly identified a scientific article available on-line from publications of USAMV of Bucharest.

**V3Q5.** Response to the explicit request for identification V3Q5 begins/comprises (the same two scientific articles), and ends with a text that is similar to those in the corresponding areas in response to the V2Q4 statement.

From observing and analysing the results obtained by performing the exercise with the two working tools, it is noted that:

- each of the two working tools has advantages and limits, and

- the main advantage of AISA1 from TC1 is that it can be used to generate information in the form of texts that have a type of NLP (Natural Language Processing), which is, closer to human expression/behaviour,

- the main advantage of AISA2 from TC2 is that it can generate texts in which it provides access to the sources it uses in generating the information, because it embedded also links in the answer.

By using the two AI tools, primary guidance can be achieved in identifying the sources for accessing the desired information, and it can help to educate an inexperienced user in improving the documentation competence from scientific sources.

## CONCLUSIONS

The results obtained by performing the exercise of using two AI working tools (AISA1 from TC1 and AISA2 from TC2), highlight for the identification of LED's keywords, light and plants in scientific articles available on-line from publications of USAMV of Bucharest, the existence of peculiarities to be used according to the needs of the user.

AISA1 tool from TC1 generated the most useful information for responding to V2Q4 *versus* V1Q1, V1Q2 and V1Q3. Practically, the response to the V2Q4 statement reduces the

search area of information to a narrower level and more applied to a particular direction of information because it uses a sequence of keywords as opposed to V1Q1, V1Q2 and V1Q3 that used only one key word and provided information at a broader and less applied level.

Meanwhile, the response of the AISA1 tool from TC1, at the explicit identification request V3Q5 is different from the responses from the V1Q1, V1Q2, V1Q3, and V2Q4 statements, respectively, by signalling the presence of certain information that for AISA1 from Open AI "is not available". But the answer provides information about how to search for information by exploring within a series of Academic Databases type.

AISA2's TC2 tool has generated the most targeted information, both for the response to the V2Q4 statement and for the response to the explicit V3Q5 identification request, unlike the V1Q1, V1Q2, and V1Q3 statements, because it mentions specific and relevant information, about a scientific article from a USAMV of Bucharest publication.

Responses provided by The AISA2 tool from TC2 to the V2Q4 statement and the explicit V3Q5 identification request, unlike the responses from the V1Q1, V1Q2, and V1Q3 statements, no longer provides information about sources of access to USAMV of Bucharest publications. Also, the responses of the same tool, to the V2Q4 statement and to the explicit identification request V3Q5, were similar.

On the overall, the results of the exercise indicate that according to certain specific academic needs of the user, each of the two AI tools must be analysed and compared before selecting one of them for the primary verification of the existence of LED's, light and plants keywords in scientific articles available on-line from USAMV of Bucharest publications.

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