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Apis Mellifera Animal Study in a Role Perspective Using the Bibliometrix Tools (SLNA Method Application)

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ABSTRACT

There is no research on the study of Apis mellifera using bibliometrics tools. This study aims to determine the results of the study of Apis mellifera from a role perspective using Bibliometrics Tools. This study uses an approach that uses the Systematic Literature Network Analysis (SLNA) method assisted by bibliometrix tools in the form of four applications OpenRefine, VOSviewer, Bibliometrix, and Tableau Public. The data source used is the Scopus database. This study uses a confirmability test. Journals that publish many articles about Apis mellifera include Apidologie, Insects, and Scientific Reports. Authors who have published many articles about Apis mellifera include Neumann P, number 32, Chen Y, and Le Conte Y, number 20. The years that published many articles about Apis mellifera are 2021 and 2020. The theme network consists of 5 clusters; the farther the distance between topics, the more people rarely research the topic/theme. Apis mellifera is the dominant pollinating insect that helps pollinate many plants, such as blueberries, and other roles, namely as medicine, from propolis to honey bee cocoons. Meanwhile, the detrimental role caused by Apis mellifera honey bees and other pollinating insects is as a vector of diseases that causes the carrying of harmful bacteria that can attack plants which, of course will reduce production yields.

ARTICLE INFO

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INTRODUCTION

Indonesia has many species of honey bees that are widespread throughout the island. Honeybees are categorized in the Hymenoptera Order. This bee is included in the eusocial insects that live together in the nest (Retno Sari & Widhiono, 2020). In nature, honeybees are essential in pollinating plants (Roubik, 1989). Honey bees from the genus Apis are social insects famous for their honey production. Indonesia has five successful honey bee species, Apis Andreniformis, A Dorsata, A Cerana, A Koschevnikovi, and A Nigrocinca. Apis Nigrocincta is an endemic honey bee on the island of Sulawesi and the surrounding islands, while Apis Cerana is an introduced honey bee from other regions in Indonesia (Nuraini & Purwanto, 2021).

Honey bee life provides very many benefits for humans, ranging from the bees themselves to the products produced. In the agriculture and plantation sectors, honey bees are one of the natural pollinators to help the pollination process (Devkota, N., & Phuyal, 2016). In the health sector, some honey bees for various types of weight to increase endurance (Sari & Muchlis, 2022). Another benefit of honey bee life is obtained from the product produced, honey. In addition to honey, there are Royal Jelly, Night, Pollen and Propolis. The role of honey bees has a very important role for plants because honey bees help in the pollination process. Honey bees can also be cultivated to take honey and produce economic value for the community.

One of Apis Mellifera's social insects that plays an important role as pollinators (pollinators) in plants that have a larger body size when compared to other types of bees. Apis Mellifera has a special body to accommodate large pollen (pollen base), it is very beneficial in the process of pollination of plants, because the pollen carried from the flowers visited will be more and more. The more pollen that is carried away, the more pistil will be extruded, this can certainly increase production from the number of seeds and the weight of the fruit produced.

Mugniar stated that the transfer of Berksari to the head of the pistil in the pollination process was more effectively assisted by insects. The interaction between bees and flowers is a mutually beneficial interaction, where bees get feed from flower nectar and flowers are helped in the pollination process so as to produce seeds and fruit (Retno Sari & Widhiono, 2020).

Bees generally collect pollen that has high protein content during the activity of finding food in the spectrum of plant species, In contrast honey bees tend to exploit various plant resources to collect the number of pollen rather than the quality of pollen (Khan & Ghramh, 2021). Pollination by insects is essential for the continuity and reproduction of various plants, including agriculture, medical herbal plants, horticulture, and wild plants.

In previous studies, many animal species of mellifera species have been studied (Suhandy et al., 2020). However, Insecta animal research, especially Apis Mellifera, which is related to conducting literature studies related to the journalized journal, has never been studied by many people. At the same time, we know that a reputable journal is a significantly updated source and the level of validity is very high. The method used in the literature study is the Systematic Literature Network Analysis (SLNA) method, which is a combination of the SLR (Systematic Literature Review) method, and BA (Bibliometrics Analysis) with the use of these methods can present relevant literature. Using this method, a bibliometric device (Bibliometrics tools) includes software applications such as openrefine, vosviewer, tableau, and bibliometrix

By conducting research literature reviews in invertebrate animal studies in insect classes by applying the SLNA (Systematic Literature Network Analysis) method supported by the use of Bibliometrix Tools, researchers can find out the potential of the Apis Mellifera bee species, the role of mellifera bees Insekta in Apis Mellifera bees, theme networks, years of publishing articles, author articles, urgency positions The importance of research related to the study of Insekta class animals, especially in the Apis Mellifera species. Based on the problem above, the research takes the title of the APIS Mellifera Animal Study in the role perspective using the Bibliometrix Tools (SLNA Method Application) which aims to find out the results of the study in the role perspective of the Apis Mellifera animal using the Bibliometrics Tools as the application of the SLNA method, and to find

out the most journals Publishing the topic of the study of apis mellifera animals, author who dominates in the publication of the topic of the study of apis mellifera animals, the year of publication which discusses the topic of the study of apis mellifera animals, the theme networking relationship on the topic of the apis mellifera animal study, the results of the analysis related to the topic of mellifera in the journal articles has been chosen, the beneficial role possessed by Apis Mellifer, the detrimental role possessed by Apis Mellifera.

METHOD

The research uses data information gathering techniques through various literature, books, and articles from existing research results so that they get a new theory about the problems analyzed are literature research (Sari & Asmendri, 2018). Therefore literature research really requires accurate data from various trusted sources. In literature research, using a type of qualitative approach because it is according to Fadli (2021) The qualitative approach requires that researchers can recognize the subject to be examined. So it becomes a necessity to examine the phenomenon that is developing so that research can produce accurate data.

This study aims to analyze computer teaching materials in biology learning bibliometric tools (SLNA method application). This study only analyzes computer-based teaching materials on biological learning biotechnology using the SLNA (Systematic Literature Network Analysis) method based on several applications (Openrefine, Vosviewer, Bibliometrix, and Vosviewer).

This study has produced a variety of information data about "Computer -Based Learning Materials in Biological Biotechnology Material Learning" because the focus of the qualitative approach lies in the interests and inductive nature. Qualitative research has a variety of approaches, so the results in the qualitative approach can be in the form of descriptive data in writing format (Yusanto, 2020). In this study, the data collection instrument is the journal search engine application in Scopus. The selection of the database Scopus is made to get articles with quality that has been tested so that the data used can be known the validity of the data. The steps of research procedures include:

1. Search for journal articles on Scopus by opening the scopus site access via link (https://www.scopus.com).
2. Conduct data processing using an open refine application, for the process of filtering data based on CSV data from Scopus.
3. Conduct data processing using the VosViewer application, the data processing process through the VosViewer application to get visualization of existing keywords.
4. Conduct data processing through the tableau application that aims to alternative visualization of the information obtained.
5. Conduct data processing through the bibliometrix application that aims to visualize data.
6. Choosing a journal article to be analyzed (20 pieces) based on data processing data.

After the data is obtained, the data is in the form of articles in the transfer or entered in the applications mentioned then the results in the form of images are analyzed descriptively. This study uses a qualitative approach that uses the Systematic Literature Network Analysis (SLNA) method. SLNA is a research method that combines bibliometrics and literature review activities (Colicchia,

Creazza, Noè, & Strozzi, 2019). The research instrument in this study was the researcher, assisted by several applications: the Scopus site, the openrefine application, the VOS viewer application, the bibliometric application, and the tableau public application. The primary data taken from there Scopus, as many as 2,443 articles with what will be used for library analysis is 30 articles. As for what you want to get from this study is outlined in what journal research questions are much publishing about the study of Apis mellifera animals? Who is the author who dominates in the publication of the topic of the study of Apis mellifera animals? In what year is much discussing the topic of the study of Apis mellifera animals? What is the relationship between the theme network on the topic of the Apis Mellifera animal study? What are the analysis results related to the Apis Mellifera in the selected journal article? What is the detrimental role that Apis mellifera has?

In this study, the data validity test was conducted in the form of a confirmability test (certainty), which was also called the objectivity of data researchers and was processed through applications to produce article information which was then concluded to be juxtaposed into a library analysis.

Table 1. Reference criteria in finding data for the analysis process

No.	Criterias	Condition
1	Languange	English
2	Published year	2019-2922
3	Source of Database	Scopus
4	Keyword	"*Apis mellifera*"

Table 2. Aplication used in research

No	Aplications	Aims	Logo	Link
1.	Scopus	Scopus is one of the largest abstract databases and quotes used on this research.	ELSEVIER Scopus	https://www.*VOSviewer*.com/)
2.	OpenRefine	OpenRefine is a tool that works to memorize the data data that is produced from the journal according to	OpenRefine	https://openrefine.org/
3.	VOSviewer	Vosviewer is a software tool for developing and visualizing bibliometric networks used as data	VOSviewer Visualizing scientific landscapes Nees Jan van Eck and Ludo Waltman Centre for Science and Technology Studies Leiden University	https://www.*VOSviewer*.com/
4.	Bibliometrix	Bibliometrix is a software that serves as visualizing a data	bibliometrix	https://www.bibliometrix.org/
5.	Tableau Public	Tableu Public is a software that can facilitate the manufacture of interactive visual analysis in the form of a dashboard, functioning to translate data into a form of visualization.	+ableau public	https://www.*Tableau*.com/

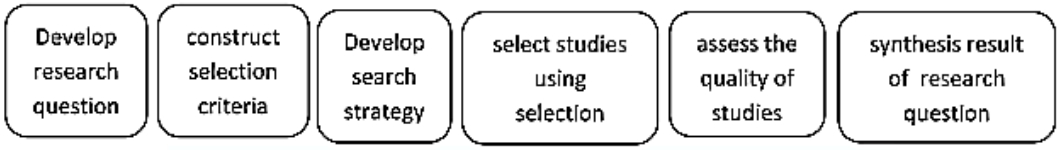

Figure 1. Diagram of Systematic Literature Review (SLR) process in analyzing articles

Based on the diagrams on the process of systematical literature reviews, developing questions, developing choice criteria, developing search strategies, selecting studies to develop selections, evaluating or evaluating from quality studies, and synthesis of results from research questions. The study procedure in this study is, among others:

1. Performing a journal article in Scopus Using Mellifera's APIS Keywords with Five-Year International Journal Articles Criteria (2018-2022);

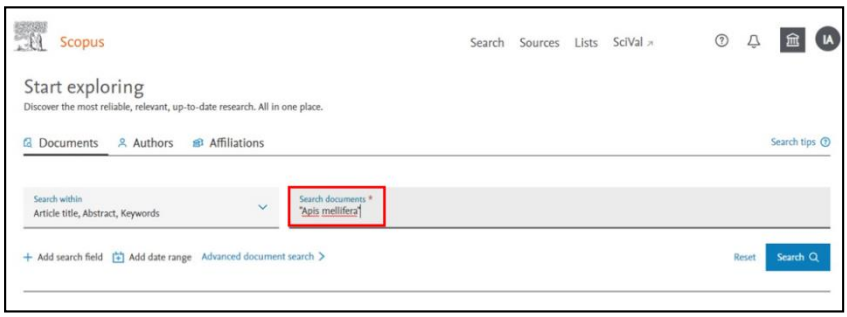

Figure 2. Saerching data on Scopus

2. Perform keyword data sorting from journal articles obtained using OpenRefine applications. Keywords that are considered to have the same writing and meaning can be in Merge to facilitate the reading and visualization of keywords in the next process;

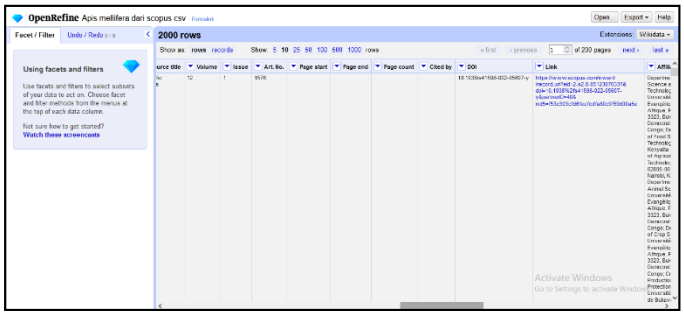

Figure 3. Filtering process in *OpenRefine*

3. Perform data processing process through the Vosviewer application to obtain visualization from existing keywords. In addition, there is also a group of keywords that can facilitate the determination of journal articles that will be used in Process Literature Review. In addition to keywords, other information, such as the author involved, can be visualized, and this information can be used for data processing applied Tableau Public

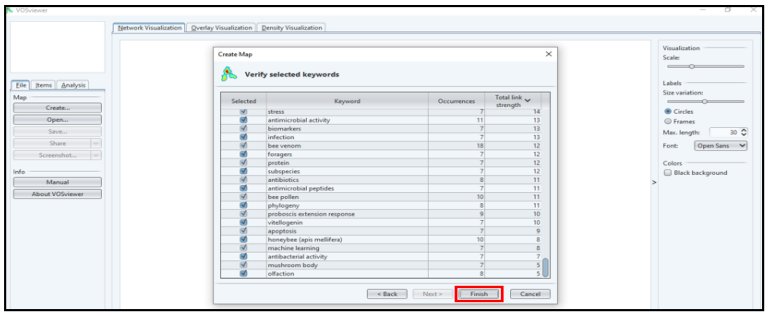

Figure 4. Filtering process in *VOSviewer*

4. Perform data processing process through the Tableu Public application aimed at alternative visualization from the information obtained. The information obtained from this app is in the form of journals, years of Public, authors, collection, and more.
5. Perform data processing process through Bibliometrix applications, from this application obtained library information from a journal article;
6. Perform analysis of the results of the existing research to find the conclusion;

Tabel 2. Format of the articles analysis of articles from vosviewer application filtering results, Bibliometrix, and Tableu Public

Research Question	No.	Tittle	DOI	*Author*	Year	Keywords	Method	Result	Conclusion
	1								
	2								
	3								
	...								
	dst								
Result									
Conclusion									

RESULTS AND DISCUSSION

Based on the research done there are results from data processing in the Vosviewer, Bibliometrix, and Tableu Public and OpenRefine applications for keywords. Here's a view of the data obtained:

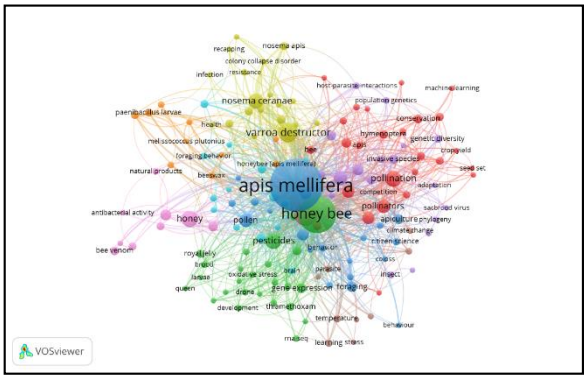

Figure 5. Network visualization results from Vosviewer applications

Based on Figure 5 shows keywords that are often used in writing articles related to Mellifera's Apis. There are different words that appear among honey bees, poly, polarizers, nerves, Hymenoptera and others. The various keywords mentioned have caused various assumptions on this topic.

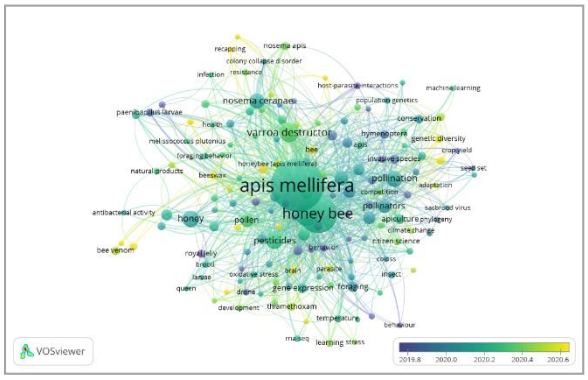

Figure 6. Visualization of overlay networks from the Vosviewer app showing the year published

Based on the picture, a network visualization describes the analysis of keywords related to the year. As explained in the research method, the time-term set for the search for bibliometric data related to Apis mellifera is the last 5 years from 2018 to 2022.

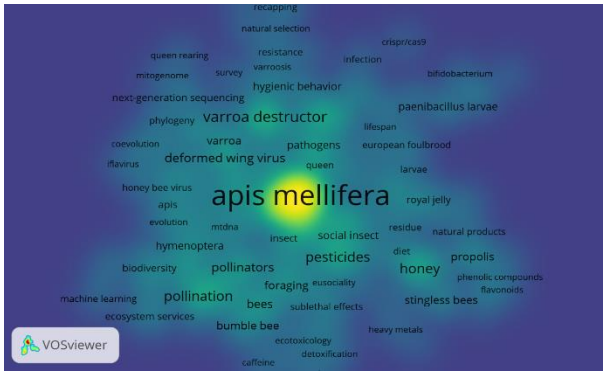

Figure 7. Visualization results of topics from Vosviewer applications

Based on Figure 7 shows that the above data from the visualization of the topic can be shown that the above data are made up of 5 clusters, and the distance between the nodes or the topic means that people rarely research the topic/theme. The above data shows the brighter the color of visualization, so it means that many people have researched the topic or theme. From many topics, the data states that the most researched themes are Varroa Destructor, Pollination, Honey, Deformed Wing Virus, and Pesticides. Meanwhile, a darker color means that few people have researched the theme.

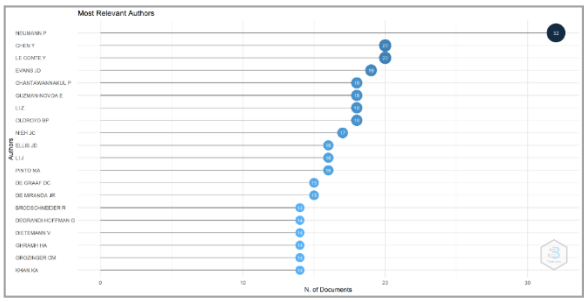

Figure 8. Domination *Author Apis mellifera topic*

Based on Figure 8. It appears that the author dominates the topics that discuss the apis mellifera namely Neumann P, Chen Y, Le Conte Y, Evans D, Chantanawakkul P, Guzman-Novoa E, Li Z, Oldryod BP, Neh JC, Elus JD, Li J, Pinto Ma, De Graaf FC, De Miranda Jr, Brodschneider R, Degrance-Hoffman, Detemann V, Ghramh Ha, Grozinger CM, Khan Ka

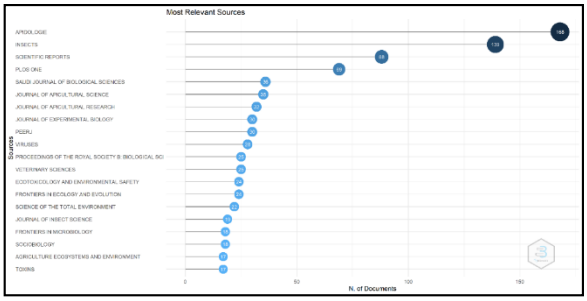

Figure 9. Journal of many publishes articles related to the topic of *apis mellifera*

Based on the picture above it is revealed that the journals that include the topics that discuss the apis mellifera include the journal Apidologie, Insects, Scientifics Report, Plos One, Saudi Journal of Biological Sciences, Journal of Apicultural Science, Journal of Apicultural Research, Journal of Experimental Biology, Peerj, Peerj, Virusses, proceedings of the Royal Society Biological Science, Veterinary Sciences, EcotoxicologyD Environmental Safety, Frontiers in Ecology and Evolution, Science of the Total Environment, Journal of Insect Science, Sociobiology, Agriculture Ecosystems and Environments,

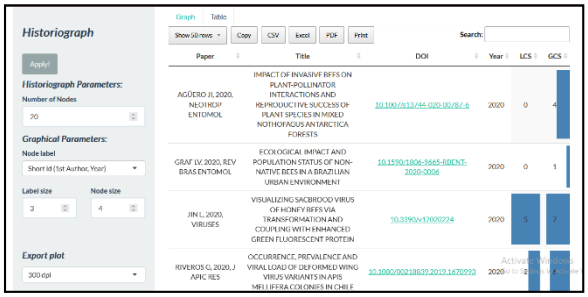

Figure 10. *Historiograph* from Bibliometrix Aplication

Based on Figure 10, data results from Bibliometrix applications in the form of titled, DOI, Year, Author of Journal Articles related to research. A group of journal articles will be more specific supervision, then be downloaded in Excel format. The data that has been downloaded in Excel format and the DOI link can be copied to the SCIHUB SITUS..

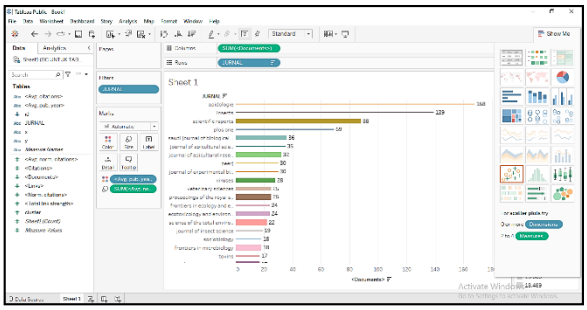

Figure 11. Visualization of data from Tableau Public Aplication

Based on Figure 11 shows that data in the form of keywords, years of publications, documentary situations, and journals that publish the apis mellifera bee. Apidologie's journal is under top of the journal that has a lot of publications about *Apis Mellifera*.

Table 3. Analysis Results from VOSviewer, Bibliometrix, and Tableau Public Screening Results

No.	Name and Year	Tittle	Result
1.	Papa, et al. (2022)	*The Honey Bee Apis mellifera: An Insect At The Interface Between Human And Ecosystem Health*	Bees as the main bioindicator of environmental pollution.
2.	Cavigliasso (2020)	*Pollination Efficiency Of Managed Bee Species (Apis mellifera And Bombus Pauloensis) In Highbush Blueberry (Vaccinium corymbosum) Productivity*	Apis mellifera pollinator produced the highest fruit against Vaccinicum corymbosum.
3.	Pietrantuono et al. (2019)	*Honeybees Generalize Among Pollen Scents From Plants Flowering In The Same Seasonal Period*	The ability of bees to generalize pollen aromas can determine the success of plant reproduction.
4.	Amro (2021)	*Pollinators And Pollination Effects On Three Canola (Brassica napus* L.*) Cultivars A Case Study In Upper Egypt*	Apis mellifera is the most efficient pollinator for increasing canola yields in the Assiut region of Egypt
5.	Grant et al. (2021)	*Honey bee (Apis mellifera) colony strength and its effects on pollination and yield in highbush blueberries (Vaccinium corymbosum)*	Bee colony strength has a positive influence on blueberry yield estimates,
6.	Knapp et al. (2019)	*Pollinator visitation to mass-flowering courgette and co-flowering wild flowers: Implications for pollination and bee conservation on farms*	Courgette is the most visited flower source. *Apis mellifera*
7.	de Souza Medeiros Santos et al. (2019)	*Bees Diversity on Flowers of Eremanthus spp. (Asteraceae)*	Trigona spiripes, and *Apis mellifera* were the most common in the two Eremanthus species
8.	Guarna (2022)	*Honey bees as biomonitors of environmental contaminants, pathogens, and climate change*	Proven and potential use of honey bees and their hive products to monitor environmental pollution,
9.	Zhu et al. (2022)	*Varroa Mite And Deformed Wing Virus Infestations Interactively Make Honey Bees (Apis mellifera) More Susceptible To Insecticides*	Varroa can adversely affect honey bees from weight loss to a major impact on honey bee physiology,
10.	Sobkowich (2021)	*Mapping The Population Density Of Managed Honey Bee (Apis mellifera) Colonies In Ontario, Canada: 2018*	Southern Ontario accounts for only 32% of the province's agricultural agricultural area where a sizeable proportion of commercial honey bees is present.

11.	Quinlan, (2021)	*Honey bee (Apis mellifera) colonies benefit from grassland/ pasture while bumble bee (Bombus impatiens) colonies in the same landscapes benefit from non-corn/soybean cropland*	Increasing pollinator populations in solar parks offers potential land use, ecosystem services, and economic co-benefits, which apply worldwide.
12.	Choi (2021)	*Nutrition, Safety, Health Functional Effects And Availability Of Honeybee (Apis mellifera L.) Drone Pupae*	Honey bee pupae are useful as a food source and a promising new functional food and pharmaceutical agent.
13.	Garibaldi (2021)	*Time To Integrate Pollinator Science Into Soybean Production*	soybeans depend on pollinators to increase the productivity of soybean plants
14.	Siede et al. (2021)	*The Bioenergy Crop Sorghum Bicolor Is A Relevant Pollen Source For Honey Bees (Apis mellifera)*	bees help stabilize Sorghum seed yields.
15.	Degrandi-Hoffman (2021)	*The Importance of Time and Place: Nutrient Composition and Utilization of Seasonal Pollens by European Honey Bees (Apis mellifera* L.*)*	The pollen collected from the two geographic areas differed in nutritional composition depending on the season and location.
16.	Andrikopoulos et al. (2018)	*Comparative Pollination Efficacies Of Five Bee Species On Raspberry*	Very good insect pollinator of raspberries, with a single visit by *Apis mellifera* or *Q lignaria* being sufficient to maximize drupelet set for some cultivars
17.	Rollin, O., & Garibaldi, L. A (2019)	*Impacts Of Honeybee Density On Crop Yield: A Meta-Analysis*	The benefits of honey bee pollination vary according to the biology of the plant.
18.	Abbasi et al. (2021)	*Standardization Of Managed Honey Bee (Apis mellifera) Hives For Pollination Of Sunflower (Helianthus annuus) Crop*	*Apis mellifera* is significantly higher than *Apis cerana,*
19.	Tesfaye et al. (2022)	*In Vitro Antimicrobial Properties Of Apis mellifera L. And Meliponulla Beccarii L. Honeys From Kellem And West Wollega Zones, Western Ethiopia*	Meliponulla beccarii which has the highest antimicrobial activity compared to Apis mellifera honey.
20.	Osterman et al. (2021)	*Global Trends In The Number And Diversity Of Managed Pollinator Species*	*Apis mellifera* the most monitored insect but other managed pollinator states.
21.	Armstrong (2021)	*Honeybee Pollination Benefits Could Inform Solar Park Business Cases, Planning Decisions And Environmental Sustainability Targets*	The benefits of honey bee pollination can inform solar garden businesses, planning decisions, and environmental sustainability targets.
22.	Jones et al. (2021)	*Honey Bee Viruses Are Highly Prevalent But At Low Intensities In Wild Pollinators Of Cucurbit Agroecosystems*	DWV was found at all sites, and viral intensity was significantly higher in Apis mellifera than in Bombus impatiens or E. pruinosa.
23.	Nanetti & Bortolotti (2021)	*Pathogens Spillover From Honey Bees To Other Arthropods*	In recent years the frequency of recorded cases of spillover from honey bee pathogens to other arthropods has increased dramatically.
24.	Nakamura et al. (2020)	*Pollination Effectiveness Of European Honeybee, Apis mellifera (Hymenoptera Apidae), In An Oriental Persimmon, Diospyros Kaki (Ericales Ebenaceae),Orchard*	Analysis of pollen grains on the body surface revealed that Apis mellifera workers would be less efficient than B. ardens ardens workers, possibly due to infrequent cross visits between the sexes of the flower.
25.	Ajerrar (2020)	*Pollination system and effective pollinators of Argania spinosa (L. Skeels)*	This result is an important tool that will contribute to maintaining argan endemic populations while preserving their genetic diversity, as well as to improving oil yield and quality through pollination management, the high AR was assessed for Apis mellifera, which can be explained by

			its foraging behavior and short handling time.
26	Hall et al. (2020)	*Bee Visitation And Fruit Quality In Berries Under Protected Cropping Vary Along The Length Of Polytunnels*	To use stingless bees effectively for pollination of plants, optimal conditions must be maintained along the polytunnel
27.	Stanley et al. (2020)	*Native Honeybees As Flower Visitors And Pollinators In Wild Plant Communities In A Biodiversity Hotspot*	in an analysis of 80 tissues globally, Apis mellifera was noted to visit about half of all plant taxa and was detected in a similar proportion of tissues from both its native and introduced areas.
28.	Castle et al. (2022)	*High Nutritional Status Promotes Vitality Of Honey Bees And Mitigates Negative Effects Of Pesticides*	that nutritional value interacts synergistically with realistic exposure to pesticides in the field on honey bee longevity. Prochloraz and thiacloprid residues detected in the plant material confirmed that the bees were exposed to PPP for at least three days.
29.	F, Jaya et al., (2020)	Antioxidant Activity And Microbiological Quality Of Bee Bread Collected From Three Different Species Honey Bee	*Apis cerana, Apis mellifera and Trigona spp.* as an agent of antioxidant and microbiological qualities, a promising natural food supplement and natural preservative.
30.	Hansen et al. (2020)	*Landscape-Level Effects Of Forest On Pollinators And Fruit Set Of Guava (Psidium Guajava L.) In Orchards Across Southern Thailand*	demonstrated that self-pollination may be the most common pollination strategy in guavas, more than previously thought, which may be the reason why fruit set is not related to forest volume and insect visits at the landscape level.

Based on the data obtained by the SLNA method assisted by the Bibliometric Tools, it was explained that the results obtained were from the analysis of Apis mellifera animals. The honey bee Apis mellifera is an insect that assists in the process of pollinating a plant, especially the Apidae family, which is a bee that has the characteristics that there is a conicula (pollen basket) on the surface of the tibia of the hind limbs, where the cobicle functions as a pollen carrier, it also has body hair and long proboscis (Michener & Tuttle, 1990). The ability of honey bees to generalize the aroma of powder-type powders from where the bees follow a "flower constant" foraging strategy in that once an insect recognizes the flowers of a certain plant species as a convenient food source, it will continuously take nectar from the plant as long as the flower is available (Pietrantuono et al., 2019). This is in line with the opinion of Thomson (2017) in De Lima, Lamerkapal, & Welerubun (2020), which states that bees have a preference for certain pollen. The temporary reason why bees collect nectar is because of the content of food substances contained in nectar, especially sugar content. The more nectar contains sugar, the more often bees visit the flower. Bees with this ability will increase the production of a plant. Vaccinium corymbosum plants depend heavily on entomophilus pollination to obtain optimal production and high quality fruit with the pollinating insect Apis mellifera producing the highest fruit (Cavigliasso et al., 2020). In this plant also the strength of honey bee colonies has a positive impact on the production of blueberries (Grant et al., 2021). Sorghum is considered as a source of nutrition for pollen-collecting insects because it is a promising new bioenergy crop for central Europe (Siede et al., 2021). With the help of pollinating insects, Apis mellifera is able to increase and maintain the availability of Sorghum in the future.

Besides its benefits as a pollinating insect in plants, honey bees are also used as raw materials and medicines where the propolis bioactive compound in Apis mellifera is rich in flavonoids and

phenolics which have antioxidant properties which function in fighting free radicals (Rosyidi et al., 2018). Proven and potential use of honey bees and their hive products to monitor environmental pollution, plant pathogens and pollinators, and emerging threats such as climate change and antimicrobial resistance. Honey bee matrices indicate spatial variations in environmental agrochemicals, precious metals, airborne particles and persistent synthetic chemicals (Cunningham et al., 2022). In addition, compared to Apis mellifera honey bees against diseases caused by pathogenic bacteria, variations in antimicrobial activity were observed against test pathogens with Meliponulla beccari honey which had the highest antimicrobial activity (Tesfayeet al, 2022). Bees fed with corn pollen had a shorter lifespan than bees fed with mixed pollen, the nutritional value interacts synergistically with pesticide exposure which is realistic in the field on the longevity of honey bees. (Castle et al., 2022).

Deformed Wings Virus was found at all sites, and virus intensity was significantly higher in Apis mellifera than in Bombus impatiens. Infected Apis mellifera and Bombus impatiens may not introduce enough infectious Deformed Wings Virus (DWV) particles into Cucurbita systems to induce infection in new hosts by direct contact or deposition of particles on floral surfaces, but are instead likely to promote transmission among themselves in other common interest sites, collect and summarize spillover cases that share Apis mellifera as a maintenance host and some of its pathogens (Jones et al., 2021). As well as the positive impacts on honey bees there are also negative impacts on the ecosystem where studies have highlighted the potentially detrimental effects of intensive crop management on wild bee diversity in agroecosystems, potentially compromising pollination services. However, the extent to which honey bee dominance and crop management interact under real-world conditions and drive the structure of wild bee swarms has not been investigated so far. This study measured species richness, as well as functional and phylogenetic diversity of wild bee assemblages in 36 pairs of organic and non-organic apple orchards during the flowering season and along geographic gradients across western Europe. Results demonstrated strong significant and negative associations between honey bee dominance and all wild bee diversity metrics, regardless of local management. Semi-natural habitats had a significant and positive effect on functional diversity, whereas urbanization and plant cover around gardens showed no effect on all the measured diversity metrics. A large number of species exhibiting less common combinations of functional traits, in sites with high honey bee dominance especially larger bee species with longer tongues suggests that wild bee diversity decreases with increasing honey bee dominance and that this negative relationship is not buffered. by alternative management practices in commercial apple orchards (Weekers et al., 2022). In addition, honey bee pathogens are transmitted to other Arthropod populations, including wild pollinators and managed pollinators. In the last 6 decades the frequency of recorded cases of spillover from honey bee pathogens to other arthropods has increased significantly. The host plasticity exhibited by some honey bee pathogens raises ecological concerns with potential negative consequences on pollinator entomofauna and ecosystems in general (Nanetti & Bortolotti, 2021). Not only that, Apis mellifera causes the inside of the banana to turn reddish brown, this is because Apis mellifera has many visits to a lot of flowers where in one of the visits there are sick flowers so that the diseased flowers carry Ralstonia solanacearum Filotipe IV bacteria (Montong & Salaki, 2019).

CONCLUSION

Systematic Literature Network Analysis research on Apis mellifera animals based on a role perspective with the aim of research on the role perspective on Apis mellifera animals concludes in the form of:

- Journals that publish many articles about Apis mellifera include Apidologie, Insects, and Scientific Reports.
- Authors who have published many articles about Apis mellifera including Neumann P, Chen Y, and Le Conte Y.
- Years that published many journal articles about Apis mellifera, namely 2021 and 2020.
- The theme network that discusses the Apis mellifera theme consists of 5 clusters, the farther the distance between nodes or topics means that people rarely do research on the topic. The brighter the color of a visualization, it means that many people have researched that topic or theme.
- Of the many topics, the data states that the most researched themes are about varroa destructor, pollination, honey, deformed wing virus and pesticides. Meanwhile, a darker color means that not many people have researched this theme.
- In Apis mellifera there are roles that are beneficial and that are detrimental in life. Apis mellifera is the dominant pollinating insect which often helps in the process of pollinating many plants such as blueberries and others and its other role is as a medicine, both propolis and honey bee cocoons have many benefits.
- The detrimental role of Apis mellifera caused by Apis mellifera honey bees and other pollinating insects, namely as disease vectors. So pollinating insects cause the carrying of bad bacteria that can attack plants which of course will reduce production.

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