TESTING BOTANICALS IN HUMAN OR ANIMAL HEALTH AND WELFARE:
OBJECTIVE ASSESSMENT OF THE AVAILABLE LITERATURE IS A KEY ELEMENT FOR SUCCESSFUL STUDIES

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INTRODUCTION

In a context of changing legislation in Europe on the reduction of antibiotic use in livestock, the MEXAVI[1] project aimed to develop a methodology to evaluate the potential of plant extracts to improve natural defenses in poultry, from the selection of plants to the measurement of biological effectiveness. This poster only focuses on the first step: **analysis of scientific literature to select the most promising plants**.
Several thousands of plant species are considered to be medicinal. There are as many published studies investigating plants biological activity. However, a close look at the literature reveals that even though precise results are presented in every paper, **the botanicals' specification is often unsubstantial and insufficient to allow a proper replication of the studies**.

[1] MEXAVI : Methodology to evaluate plant EXtracts in AVIculture

MATERIAL AND METHODS

BIBLIOGRAPHIC SEARCH

The subject **"the use of plant extracts to improve natural defenses in poultry"** comprises **3 separated concepts**, for which keywords were chosen and tested separately to run the search.

3 complementary scientific bibliographic databases were searched. Using bibliographic databases instead of other web search engines ensure a **replicable search**.
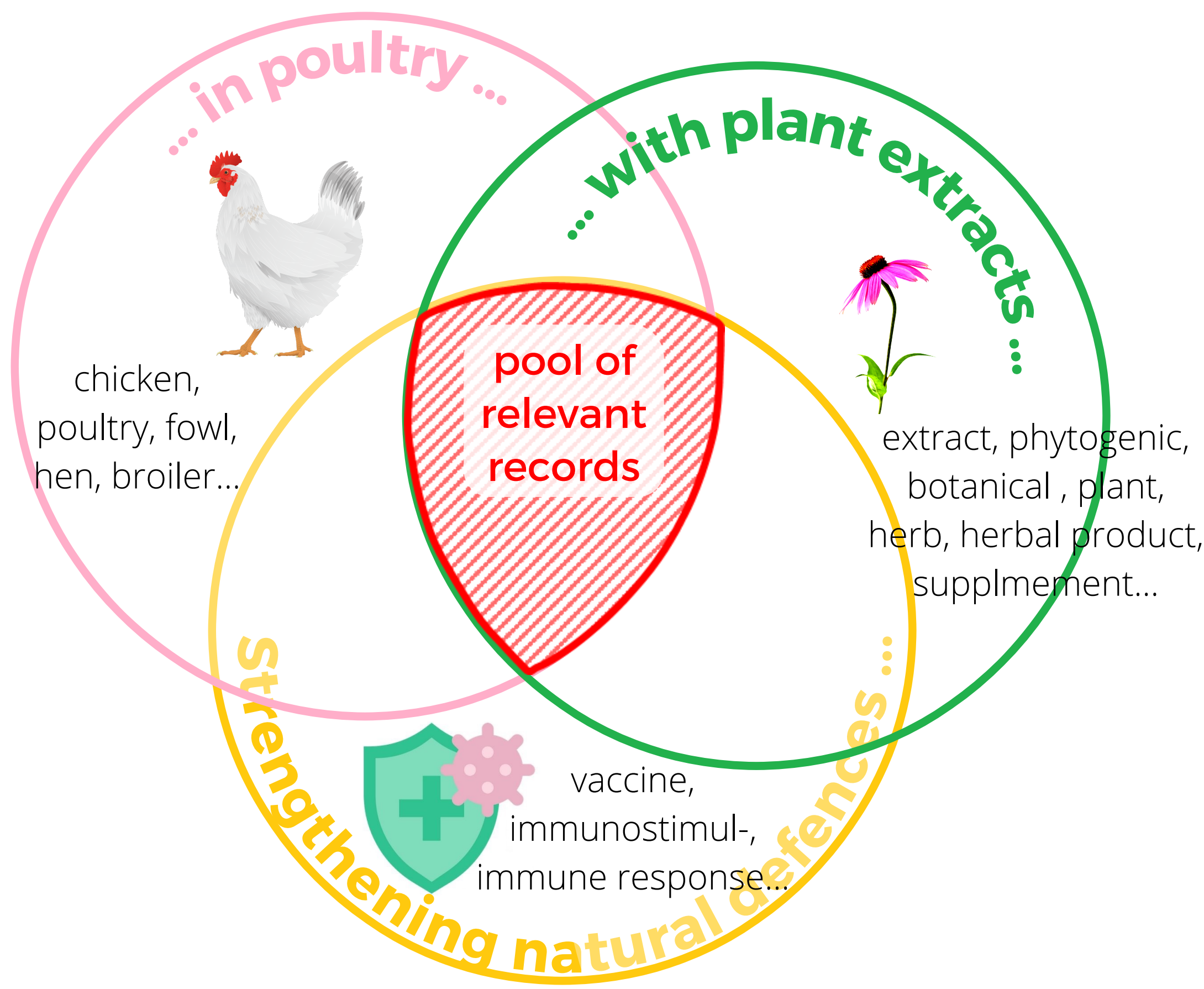
SETTING UP A SCORING GRID

An assessment grid was built to help the **rigorous evaluation of each paper regarding botanical and phytochemical information**. Indeed, if some of this information goes missing, the results may not be reproducible nor comparable with other studies, both of which are basic requirements of science.

The grid allows to allocate points when the following information is provided:
- characterisation of the **plant species**
- characterisation of the **extract used**
- characterisation of the **product under test**
- characterisation of the **product's administration**

For each item defined, a greater or lesser number of points is awarded according to its importance for the quality of results.
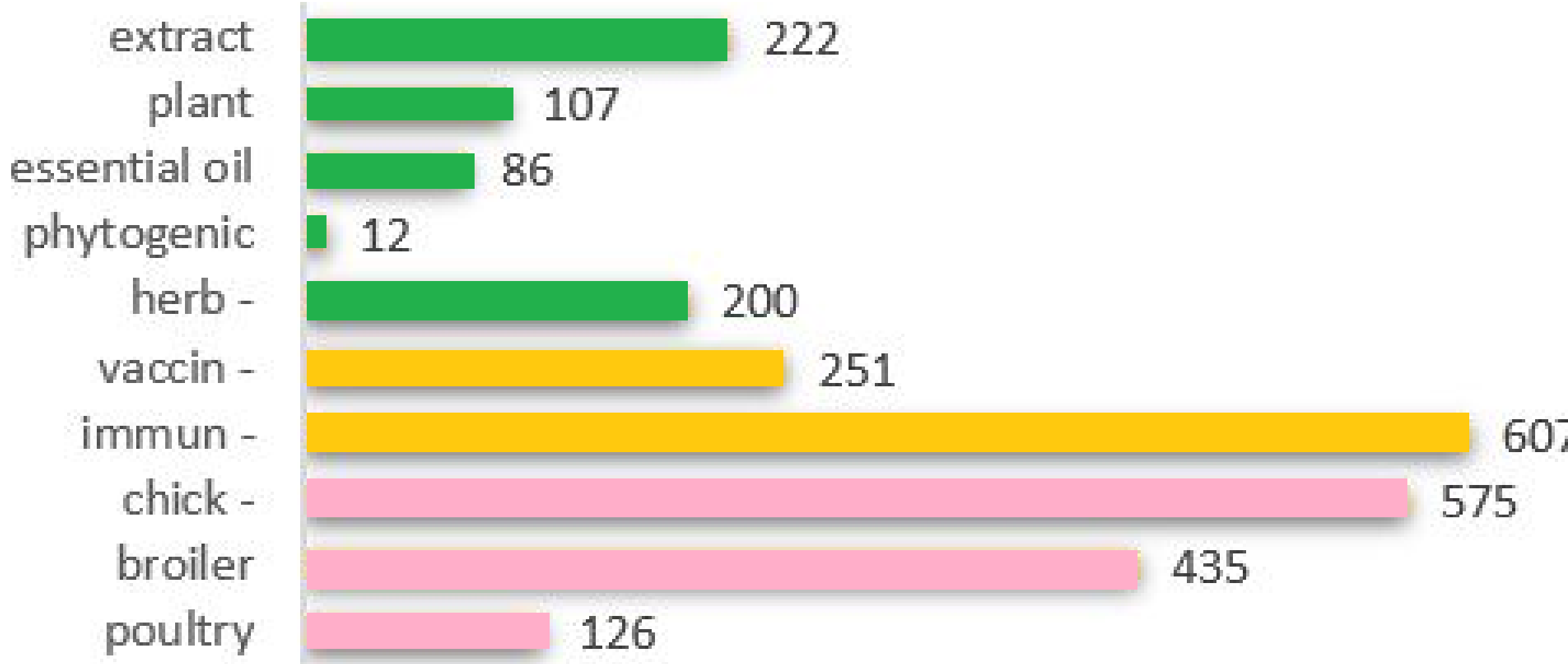
... in poultry ...   ... with plant extracts ...
chicken, poultry, fowl, hen, broiler...
pool of relevant records
extract, phytogenic, botanical , plant, herb, herbal product, supplmement...
vaccine, immunostimul-, immune response...
Strengthening natural defences ...

Grid Title	Description	Point awarded when information is provided
Item	Specify whether the abstract or the full text was examined	
Status	Indicate : MI = missing information	
CHARACTERISATION OF THE PLANT		
	no information	0
	A vernacular (common) name is given	0.5
Scientific name	Genus is specified : ex: *Echinacea*	0.75
	Genus and species are specified. e.g. *Echinacea purpurea*	1.5
Plant variety	no information	0
	Information provided. e.g. cv. *Magnus*	0.5
Part of the plant used	no information	0
	Information on what the plant part is used: leaf, stem, root, etc.	1
Treatment / how the plant parts were processed	no information	0
	Processing (drying, fermentation, ...): the information provided	1
	no information	0

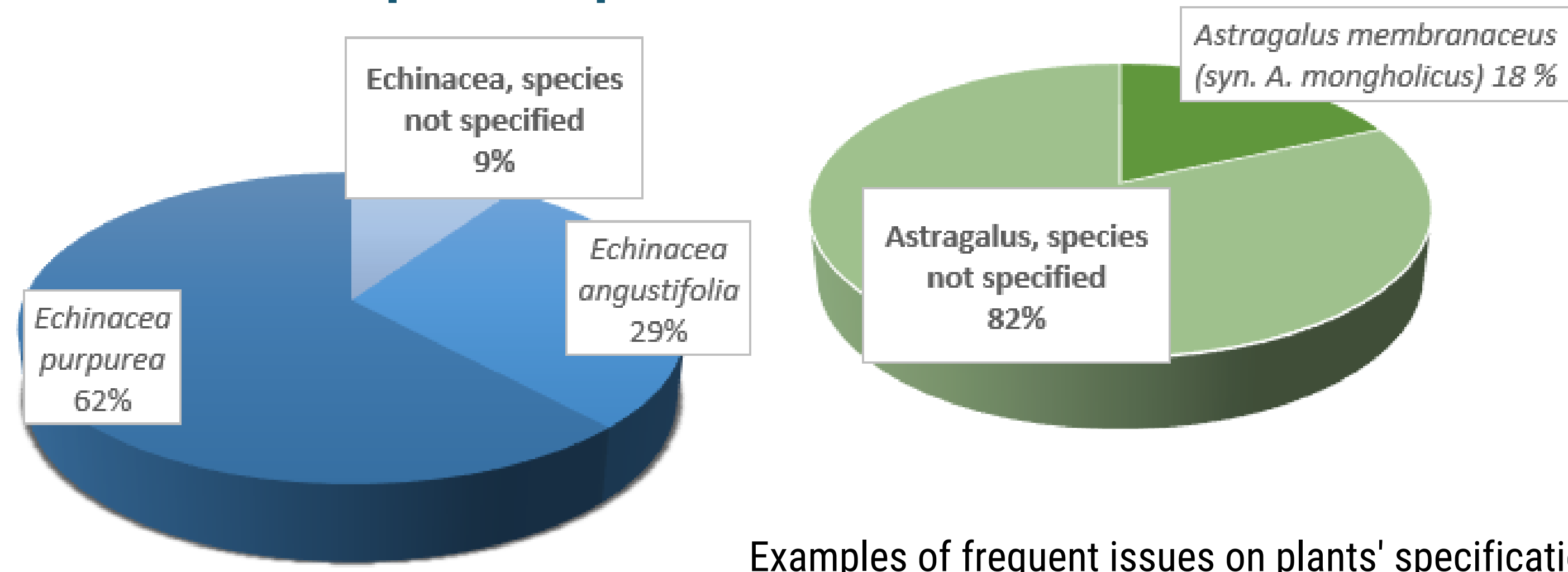A detail of the in-house scoring grid. An article may score to a maximum of 20.

RESULTS

ANALYSIS OF THE BIBLIOGRAPHIC RECORDS

628 bibliographic records were retrieved. We extracted the words cited in abstracts and titles referring to each of the 3 concepts of the search. Some words are more used than other, e.g. p*hytogenic* is a trendy word, but not efficient in a search.

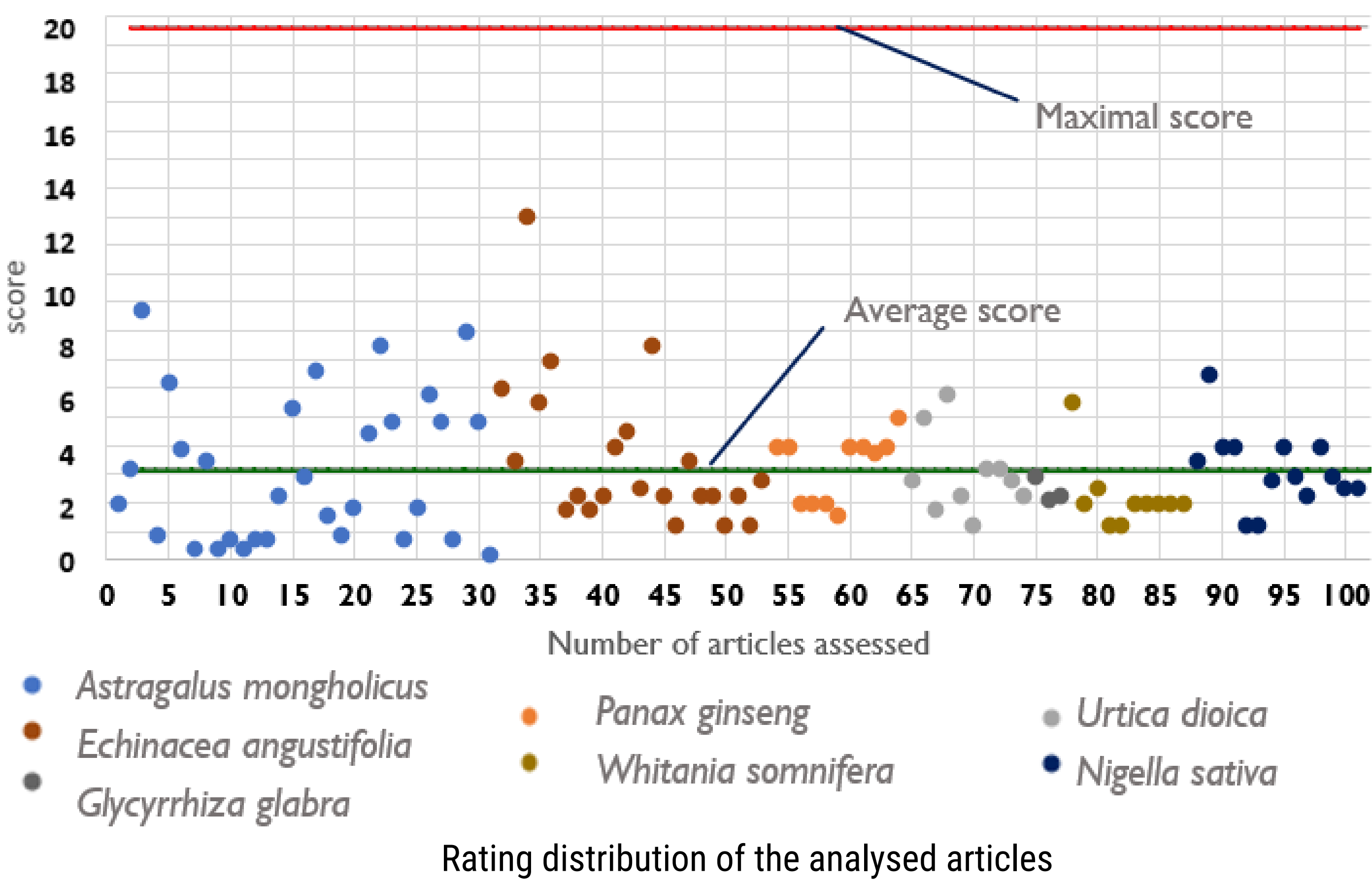|	
extract	222
plant	107
essential oil	86
phytogenic	12
herb -	200
vaccin -	251
immun -	607
chick -	575
broiler	435
poultry	126

These studies focused on **48 plants**. Among the challenges encountered, **only 2/5 of the papers gave an accurate name for the plants species studied** (267 studies on 628).

Echinacea, species not specified 9%
Echinacea angustifolia 29%
Echinacea purpurea 62%

Astragalus membranaceus (syn. A. mongholicus) 18 %
Astragalus, species not specified 82%

Examples of frequent issues on plants' specifications

ASSESSING THE RECORDS WITH THE SCORING GRID

7 plants amongst those with the highest occurrence were selected, and the abstracts of the related 104 studies were assessed using the scoring grid.

Maximal score
Average score
score
Number of articles assessed

- *Astragalus mongholicus*
- *Glycyrrhiza glabra*
- *Panax ginseng*
- *Echinacea angustifolia*
- *Whitania somnifera*
- *Urtica dioica*
- *Nigella sativa*

Rating distribution of the analysed articles

Results show that botanicals tested are not sufficiently described to validate the reproducibility of the results. Indeed, **the average score does not reach 4 out of 20**. Almost all the references studied have a final score below 10.

CONCLUSIONS

The **issues highlighted on the quality of the botanical and phytochemical characterisation of the material involved in studies evaluating plant biological activity** eventually hinders science and **casts doubt on the reliability** of medicinal plants. MEXAVI project endeavoured to provide a replicable method to rigorously analyse a pool of relevant papers and assess their quality for the phytochemical step. It resulted in the design of a scoring grid for the non-specialists of plant extracts who are involved in testing plant-based products for their bioactivity. This tool has been published so far in French only.

REFERENCES : iteipmai (2021). Mexavi. iteipmai website. https://www.iteipmai.fr/71-nos-projets/266-mexavi
Travel *et al.* (2021). Methodologies to Assess the Bioactivity of an Herbal Extract on Immunity, Health, Welfare and Production Performance in the Chicken : The Case of Melissa officinalis L. Extract. *Frontiers in Veterinary Science*, 8. https://www.frontiersin.org/article/10.3389/fvets.2021.759456

IHC 2022 ANGERS — FRANCE