



Bioresources: Back to the Ancient World?

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1. What are the Bioresources?

With the increase rejection of synthetic chemistry, recourse to natural substances is privileged in the biocide and plant protection sectors. Indeed, various voices are raised and demand that plants be treated other than with pesticides and chemical fertilizers. Many people want to quickly expand the range of herbal treatments based on “natural” products. Therefore, Bioresources are naturally called upon to help with this demand from civil society. Does this mean going back to ancient times?

2. Natural Substances- a Changing Scenario

By “natural” we mean products formed by the combinations produced by nature (which is in itself a form of chemistry). In the minds of such treatments are opposed to products derived from the “Art” of learned chemistry. By “Art” we understand its primary meaning, meaning the “artifices” and ingenious processes carried out by laboratory tools which make it possible to obtain more quickly and in large quantities either already existing forms of materials or new forms. The question which then arises is the following. What obstacles are rising before us to rapidly expand the range of plant-based treatments available to us? We have become accustomed to calling an epistemological obstacle an obstacle which prevents the researcher from going in the direction of a temporal chronology which would necessarily lead to a “better state” and a technical “progress”. Following the historian of science, Grmek, we admit that on this time axis, there are advances and stops (Grmek et al., 1980). We believe that other paths of scientific thought are then possible even if it evokes a “world before” where chemistry did not occupy such a large place in our societies. It is therefore legitimate to ask the question: why approaching this world with less chemistry seems to us less “scientific” and therefore formidable? What are our obstacles of thought to approach this world?

While a few natural substances have been approved for plant protection, out from our work, by ITAB, the disappearance or at least the sharp reduction in agricultural synthetic pesticides has increased demand. This expansion, as well as the overall safety of these natural substances (Marchand, 2015; Charon et al., 2019), although chemicals they are not always used in a harmful way (Marchand, 2019), as has boosted attraction

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for BioControl Agents (BCAs) (Robin and Marchand, 2019).

Some applicants have also launched approvals with the same substances in the biocidal regulations, using the same application files as the source medium. Over the last 7 years, quite a few basic substances (17) - horsetail, nettle, onion and willow extract (Deniau et al., 2019), vinegar, whey, sugars (sucrose and fructose), sunflower oil, mustard seed powder, diammonium phosphate, sodium chloride and lecithins - approval were obtained by ITAB (Jolly et al., 2018; Marchand, 2019).

For all that, is it a step backward in time? Here are two examples that show it isn't. It is research on the history of science in medieval times that allows us to highlight certain epistemological obstacles that stand in our way. We recall here some concepts which allowed medieval scientists to collect and assemble field data in various fields.

a) The notion of "property".

This notion that we find in books of, botany, pharmacology or medicine allows to cover a category of properties that were impossible to guess. This property was observed, tested over time and then listed by scientists (Katouzian-Safadi, 1998; Katouzian-Safadi et al., 2018). Chemical or physical evidence was not required. The scholar and philosopher Razi expresses this idea very clearly in his work (Katouzian-Safadi, 2004).

b) The notion of the "chain of transmission"

The properties of the products observed in the field were reported by people, through a chain of oral transmission before being written down by an author and kept in a book. Confidence in this chain of transmission was sufficient to report these properties.

c) The possibility of not obtaining the expected effects

Ibn Baytar (Cabo Gonzalez, 1997) a 13th century Andalusian scholar, wrote a very important book in pharmacology and botany called *al-Gami* ' [The Summary Book of the Simple] (Leclerc, 1997). In this book, very frequently, he reports situations where the same product could have given different effects in different practitioners (Cabo Gonzalez, 1997), p. 340-3, n° 408, for example see "La manne" or manna (mann in Arabic). The forms of experiment and evidence introduced by contemporary chemistry have the advantage of the certainty of measurements, dosages and repetition of each manipulation under standardized laboratory conditions. But at the same time, they erased the notion of "property", a faculty accepted without chemical proof. The notion of the chain of oral transmission has also lost its value.

The approach of medieval scientists linked to the material, the value of field experience for individuals and the confidence in the chain of transmission have made it possible to preserve botanical, pharmacological and medical knowledge over a long period of time. We cite an example taken from Ibn Baytar.

Clays have different properties depending on their geological history, depending on the minerals locked up, depending on

the region where they are harvested (Rautureau et al., 2017). In the field, humans have experienced these variations in properties; the texts written by scientists partly restore these very diverse properties depending on the region where the clay is extracted and the use that has been made of it. Under the heading "clay" or "*tin*", Ibn Baytar, cites nine different forms of clays with different effects. One of these forms called *karmi* (Cabo Gonzalez, 1997) p. 423, n° 1493, from Syria was used to coat the wood and the base of vine buds. This had the effect of eliminating the worms that infected the vines. For this use, the author is based on observations collected in the field. Being himself a scientist worthy of faith, by registering this information, he participates in the chain of transmission of this local knowledge. This example is totally linked to the basic substance clayed charcoal approval ITAB obtain for a small French SME (EU, 2017).

Agriculture is a practical profession which requires a presence in the field and where the essential part of the transmission was and is done orally. Thus, many practical aspects have been able to disappear, while leaving a social imprint. Then, the modern synthetic chemistry covered everything in a fog. In 2016, ITAB took part in the replacement of the supposed endocrine disrupting piperonyl butoxide (PBO) by sesame oil (Marchand et al., 2018), as in... 1940, before the intensification of chemistry in plant protection. To be noted that although PBO is considered a synthetic chemical, it is a semisynthetic molecule in part derived from natural safrole. Again, is 1940 old or not?

Many plant extracts have been deposited (Billet et al., 2019) and some obtained (Vekemans and Marchand, 2020) for plant protection in Europe (Stefanini et al., 2018), apart from well-known compounds such as Neem extract and pyrethrums. Even if some are known for their properties that ethnobotanical research reveals, their application in plant protection (Marchand, 2017a) is, in our opinion, quite recent putting in perspective the origin of agriculture; or else this knowledge has been lost (Ramirez, 2007). Vinegar, for example, is undoubtedly the most symptomatic: its general biocidal properties have been known and used for centuries/millennia, but its specific agricultural applications are recent.

3. Conclusion

Some will welcome natural substances participating in ecological substitution, others will point out the low effectiveness or ineffectiveness of these solutions. Nevertheless, the proof is now made that although all these natural substances are not completely free of risks or dangers, most of them can contribute to the reduction of impacts caused by exogenous molecules used in plant protection, especially on organic production.

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