CHINESE SCIENTIFIC INFORMATION; AN ESSENTIAL INFORMATION SOURCE TO ANY BUSINESS INTELLIGENCE COMPETITIVE WATCH.

Nadège GUENEC, nadegeguenec@gmail.com

Université Paris-Est, Sciences et Ingénierie de l'Information Stratégique (S3IS), 5 bd Descartes, 77454 Marne la Vallée, France

Mots clefs :
Intelligence économique, veille compétitive, information scientifique et technique, data-mining, découverte de connaissance, Chine, Bases de données.
Keywords :
Business Intelligence, competitive watch, scientific and technical information, data-mining, knowledge discovery, China, Databases.
Palabras claves :
Inteligencia de Negocios, vigilancia competitiva, información científica y técnica, data-mining, descubrimiento de conocimientos, China, bases de datos.

Résumé

Toute démarche d'Intelligence Economique accompagnant l'implantation d'une activité à l'étranger démarre par la capacité à déchiffrer l'environnement d'affaire. Or une grande part de l'information à portée stratégique est issue de l'analyse du jeu des acteurs opérants dans le secteur d'activité visé. L'incapacité à « lire » la Chine et à comprendre les enjeux qui s'y déroulent, les écueils dans l'accès à l'information concernant le marché chinois sont un facteur important de ralentissement du développement des entreprises françaises sur l'un des marchés les plus dynamiques du monde. La Chine ayant mit en place une politique de développement scientifique extrêmement précise, elle vise à s'accaparer des pans entiers de l'économie et de la connaissance de demain via la prise de brevets.
Cet article propose une méthode automatique de création de connaissances de la Chine en tant que marché. Ce type d'informations à haute valeur ajoutée est créé par l'analyse de corpus bibliographiques extraits d'une base documentaire chinoise et fournit des connaissances stratégiques nécessaires à toute démarche d'Intelligence Economique sur le marché chinois. L'intérêt est qu'elle est accessible à toute personne, même non sinisante.

Abstract

While implementing its activity abroad, any organisation, has to deal with a new business environment. The ability to decipher this business environment is the condition for implanting a relevant business intelligence strategy. Such strategic information will emerge from the analysis of the different players in the relevant sector and their relation. The inability to "read" China and to understand the issues that take place there, the obstacles in the access to the right information about the Chinese market are important factors that slow down the development of French companies on one of the most dynamic markets in the world. The Chinese government has set up an extremely precise policy of scientific development which aims to capture large sections of the tomorrow world economy and knowledge via the patent and the intellectual property.
This article proposes an automatic method for creating knowledge about the Chinese market. This type of information with high added value is created by the analysis of large corpus extracted from a Chinese bibliographic database and provides strategic knowledge for a business intelligence approach of the Chinese market. This method is accessible to anyone, even for non-Chinese speakers.

1 Introduction

The opening of national economies and the acceleration of global trade have, in barely a decade, transformed the competitive environment of enterprises. The area of activity has expanded by the opening of new markets with very attractive potential. So are the BRIC (Brazil, Russia, India and China). Among these four countries, all impressive by their size, population and economic potential they represent, China is the least accessible. Brazil and India1 are using language close to ours. We have a very deep historical relationship with Russia and its manners we are well known. China is more distant and closed to our understanding because of a linguistic system radically different from the Indo-European languages on the one hand and of the fact of a culture and a thought system at odds with those of Western countries. Yet for a company of international size, which wants to extend its influence or simply to maintain its market position, including its own market, it is now absolutely essential to be present on the Chinese market.

How does a western company operate on a market that appears at first as inherently complex and enigmatic because of its otherness? During six years of observation in China, we have found out the pitfalls in access to information about the Chinese market. As on many markets, our companies are subject to some unimaginable destabilization. This unsatisfactory and powerlessness situation is shared by almost all public and private actors. [1] The inability to "read" China and understand the issues that take place in spite of sustained efforts, the tactical errors which arise from a misjudgement of the market or a biased understanding of the game players led us to consider a methodology that could provide French companies an approach to China as a market.

If a cultural approach is made of human interactions and subtleties, a market approach is now possible by the automatic processing of information and its modelling. In any process of economic intelligence accompanying the establishment of a foreign operation, a large part of the strategic information comes from analysis of the game players operating in the same sector of activity. Such automation of knowledge creation is, in addition to the human approach to the field, a real added value for understanding the interactions between the players because it provides a set of knowledge, taking into account more entities large, are more comprehensive, elusive anywhere else. Because China has highly developed technologies linked to the knowledge economy, it is now possible to explore the scientific and technological sources of information science in China. We are also convinced that Chinese sources of information will take a more and more crucial importance in any global watch. It is therefore an urgent need for organizations to get solutions that not only allow the access to this information but also are able to handle the masses of information from these sources.

Getting strategic information necessary to the survival of the company just in time, in a context of increasing internationalization and of multiplication of the sources of scientific, technical, economic ... made the important concept of business intelligence competitive watch. [2] We develop in this paper a method that will appeal any decision-maker or watcher wishing detects Chinese players in a given industry. We will take as a field of application for this example that of agricultural biotechnology and more specifically the theme of hybrid wheat in order to illustrate this information analysis approach of China. The analysis of this sector, which is an area of fundamental research, experimental and applied current gives rise to the acquisition of patents and to the marketing of commercial products. It is a very current topic.

---

[1] English is an official language of India and is the one used in the economic, political and scientific.

The analysis by the data-mining of a corpus of scientific articles extracted from a Chinese database will permit the understanding of how this sector is organized in the interior of China, what are the avenues of research, specific actors, how they evolve over time, etc.. ...

2 Method for analyzing Chinese scientific information

2.1. Sources of information - CNKI

The portal CNKI, China National Knowledge Infrastructure, is a project bringing together the various Chinese academic databases. Its development has been and remains strongly supported by the Chinese government whom relied on this portal to support the growth of the information society and the development in China of business intelligence through strategic information. [18] In addition to the Chinese databases, CNKI begins to open up to foreign bases. One such agreement has been signed with Springer in 2008 who find there an entry on the Chinese market. The consultation of bibliographic records is free, only downloading the full text is to be paid and requires a subscription. In late 2007, over twenty five million articles were referenced among the various base of CNKI.
The functionalities of the database are constantly transformed. Thus, between spring and autumn 2008, the configuration of CNKI was totally changed from the viewpoint of the user.
In addition with the very slow extraction of the corpus (it can not be done automatically), two new problems have emerged:
- On the one hand, a line of Chinese text contains up to three different fonts alternating one character to another. This cannot be remarked when reading the text but generates noise in the encoding.
- Secondly, the key words have disappeared while downloading the corpus; they no longer appear in the fields of a descriptive article.

These recent changes make it more complex bibliometric analysis. This shows the responsiveness of the Chinese on issues of information systems. However the automated processes have been adapted and the results have been obtained. It remains to be analyzed.

2.2. The corpus

2.2.1. Extraction

In part this work, we will strive to demonstrate what can be achieved with regard to automatic processing of scientific information from China.
In order not to overload the demonstration, we will work voluntarily on a little corpus. To do this we will launch a request focused precisely on male sterility, the principal condition of the hybridization process. Our research period runs from 2000 to today. We obtained 302 responses. We can thus through the analysis of this corpus see evolve over the last 8 years research on hybridization of wheat.
A more relevant analysis should collect all the articles that mention the word “wheat”. This request would permit to have a first hand view concerning the research on hybridization processes versus all the research areas related to wheat. But even if we limit the request on only one year and if we select the items

containing the word "wheat" only in the title, we obtain a corpus of 2597 responses. (Fig. 1) The analysis of such a corpus or a larger corpus if one fails the temporal restriction, would go beyond the scope of this article. That's why we have voluntarily restricted the corpus collected in a specific area.

FIG. 1: Screenshot of the query "wheat" for the period October 2007 - October 2008 CNKI

The extracted corpus will be picked as follows (Fig.2):
[Wheat AND male sterility] during the period from October 2000 to October 2008

FIG. 2: Screenshot of the query (wheat AND male sterility) from October 2000 to October 2008 on CNKI.

Then, the results of this request can be downloaded as a corpus shown as follow: (Fig. 3):

FIG. 3: Screenshot of a page of bibliographic notices proposed as a result for the query.

We note that the base is very well structured. We will thus be able to operate a number of analysis based on the metadata contained in these bibliographic notices of this database to extract a value-added information not otherwise discernible.

2.2.2. Specificity of a Chinese corpus

Our analysis focuses on the metadata contained in the bibliographic records of this corpus. This information is not visible to the simple reading and it is necessary to have a specific tool to perform the analysis by crossing metadata fields and by counting the frequency of datas. It is not simply to model information based on their content but in terms of uses that will be made.[19]

The software Tetralogie, developed by the "Institut de Recherche en Informatique de Toulouse" (IRIT) is specifically dedicated to data-mining [20] and allows the emergence of networks of actors and their dynamics from a given corpus, to highlight the evolution of concepts and topics and to detect weak signals. [21] Its use has been lauded on many occasions and our goal is to use it in a new linguistic environment. It has been necessary to think the evolution of the software in order to adapt to the environment of the Chinese language on the one hand and to the structure of the database CNKI on the other hand. Each database has its own structure and we had to adapt to the new format of CNKI. It was therefore necessary to create a descriptor of the database structure. This descriptor defines the different fields of the database, identifies their banner, their separators, their utility and the various types of information they contain. It also allows locating the beginning of each notice as well as the physical structure of the record (format and number of occurrences of banners).

An excerpt from our corpus as it appears during the download allows seeing that the articles are presented in the same way (Fig. 4):

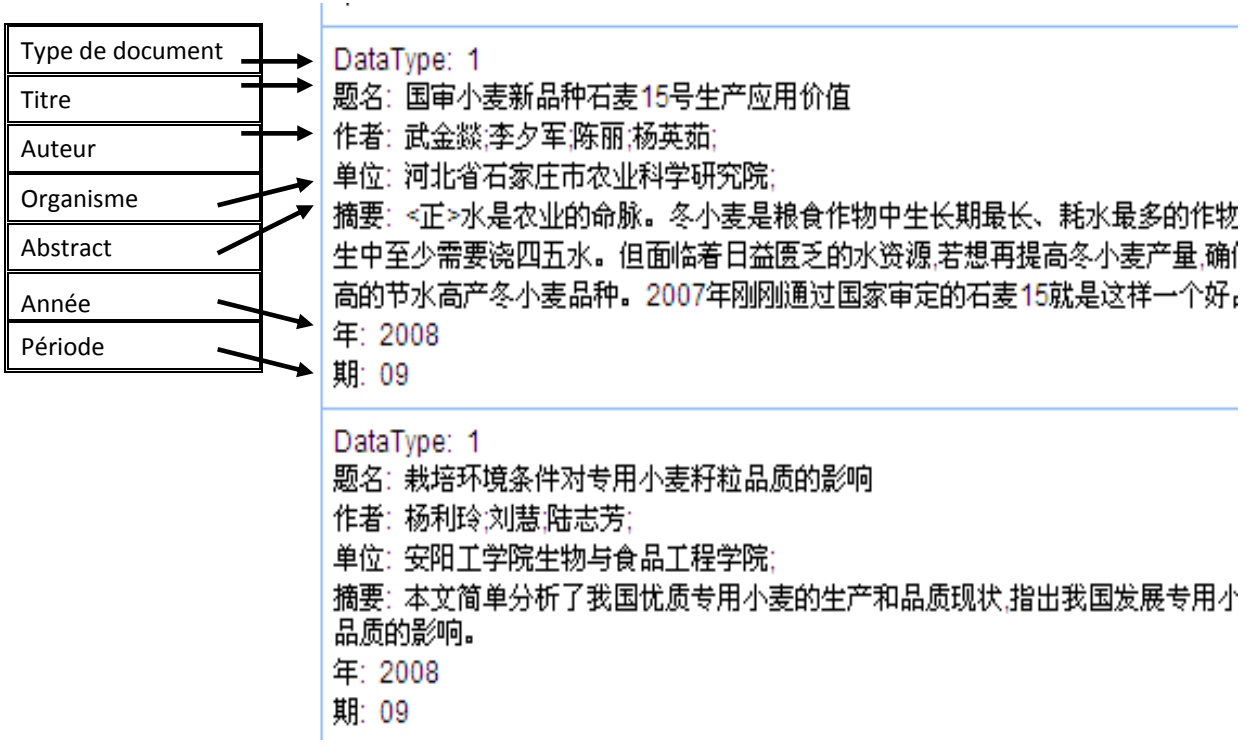

FIG. 4: Description of the metadata fields of a bibliographic notice.

This will allow automatic processing of all the bibliographic records of this corpus and will propose, ultimately, strategic analysis perfectly accessible to the non-Chinese reader even though the processed information is given in Chinese language. Concerning the processing of Chinese characters, we will then go by the Unicode codification in order to translate the metadata fields and to mark them. (Table 1)

TAB.1: Fields correspondence chinese character / Unicodewith English translation

Chinese banner	English translation	Unicode
题名	Title	题名
作者	Author	作者
单位	Organism	单位
摘要	Abstract	摘要
年	Year	&#24180;
期	Period	&#26399;

An additional challenge for treatment is that the police of the script constantly change. A sentence may contain up to three different fonts, which increases the noise in the coding and make the treatment more complex. For example, the following notice: the title field (**题名**) has two characters. The first is written with the police Simsun and the second is written with the police MS UI Gothic.

Visualisation of the code just for the field « title » :

```
??'>DataType:  1<br>
 </span><span lang=ZH-CN style='font-size:9.0pt;font-family:SimSun;mso-bidi-font-family:
 SimSun'>&#39064;</span><span lang=ZH-CN style='font-size:9.0pt;font-family:
 "MS UI Gothic";mso-bidi-font-family:"MS UI Gothic"'>&#21517;</span><span
 style='font-size:9.0pt;font-family:??'>:  </span>
```

Thus, data processing is done directly on the computer code of the Chinese language. Here is the coding of a single bibliographic notice. It will then be necessary to establish a reformer to clean up this record to keep only the Chinese characters and bibliographic fields.

Thus, the title of a notice stated:
题名:
不同时期茉莉酸甲>酯处理对光温敏雄性不育小麦颖花开放的诱导效应

is coded as follows:

```
??'>DataType:&amp;nbsp;&amp;nbsp;1<br>
  </span><span lang=ZH-CN style='font-size:9.0pt;font-family:SimSun;mso-bidi-font-family:
  SimSun'>&#39064;</span><span lang=ZH-CN style='font-size:9.0pt;font-family:
  "MS UI Gothic";mso-bidi-font-family:"MS UI Gothic"'>&#21517;</span><span
  style='font-size:9.0pt;font-family:??'>:&amp;nbsp;&amp;nbsp;</span><span lang=ZH-CN
  style='font-size:9.0pt;font-family:"MS UI Gothic";mso-ascii-font-family:??;
  mso-hansi-font-family:??'>&#19981;&#21516;</span><span lang=ZH-CN
  style='font-size:9.0pt;font-family:SimSun;mso-bidi-font-family:SimSun'>&#26102;</span><span
  lang=ZH-CN style='font-size:9.0pt;font-family:"MS UI Gothic";mso-bidi-font-family:
  "MS UI Gothic"'>&#26399;&#33545;&#33673;&#37240;&#30002;</span><span
  lang=ZH-CN style='font-size:9.0pt;font-family:SimSun;mso-bidi-font-family:
  SimSun'>&#37231;&#22788;</span><span lang=ZH-CN style='font-size:9.0pt;
  font-family:"MS UI Gothic";mso-bidi-font-family:"MS UI Gothic"'>&#29702;</span><span
  lang=ZH-CN style='font-size:9.0pt;font-family:SimSun;mso-bidi-font-family:
  SimSun'>&#23545;</span><span lang=ZH-CN style='font-size:9.0pt;font-family:
  "MS UI Gothic";mso-bidi-font-family:"MS UI
Gothic"'>&#20809;&#28201;&#25935;&#38596;&#24615;&#19981;&#32946;&#23567;&#40614;</span><span
  style='font-size:9.0pt;font-family:??'>BS366</span><span lang=ZH-CN
  style='font-size:9.0pt;font-family:SimSun;mso-bidi-font-family:SimSun'>&#39062;</span><span
  lang=ZH-CN style='font-size:9.0pt;font-family:"MS UI Gothic";mso-bidi-font-family:
  "MS UI Gothic"'>&#33457;</span><span lang=ZH-CN style='font-size:9.0pt;
  font-family:SimSun;mso-bidi-font-family:SimSun'>&#24320;</span><span
  lang=ZH-CN style='font-size:9.0pt;font-family:"MS UI Gothic";mso-bidi-font-family:
  "MS UI Gothic"'>&#25918;&#30340;</span><span lang=ZH-CN style='font-size:
  9.0pt;font-family:SimSun;mso-bidi-font-family:SimSun'>&#35825;&#23548;</span><span
  lang=ZH-CN style='font-size:9.0pt;font-family:"MS UI Gothic";mso-bidi-font-family:
  "MS UI Gothic"'>&#25928;</span><span lang=ZH-CN style='font-size:9.0pt;
```

font-family:SimSun;mso-bidi-font-family:SimSun'>应<span
style='font-size:9.0pt;font-family:??'>

The reformer that we have incorporated in Tetralogie will clean out the above notice. The following result will be reached, its format then being able to be manipulated for a bibliometric analysis:

DataType:1
题名不同时期茉莉酸甲酯处理对光温敏雄性不育小麦颖花开放的诱导效应

After having cleaned the corpus, treatment will be made. We give here some examples of results, but we invite the reader to refer himself to previous publications about Tetralogie in order to have a clearer idea of the wide range of analysis and treatments of information that can produce this software. We present here some results that can be obtained after treatment with the software Tetralogie on the corpus male sterility.

2.3. Results and analysis

Here is a first representation of the networks of players in the corpus "male sterility". We can quickly note out that the research teams are very distinct and disconnected from each other, some of them even containing only three authors. We will not talk about these little groups and will target first the biggest one. (Fig 5) Indeed, not only the collaborations between authors are numerous , which induces the existence of a real research team within which exchanges are of good profit, but more is the representation of some authors is bigger which indicates that these authors are also the most prolific.

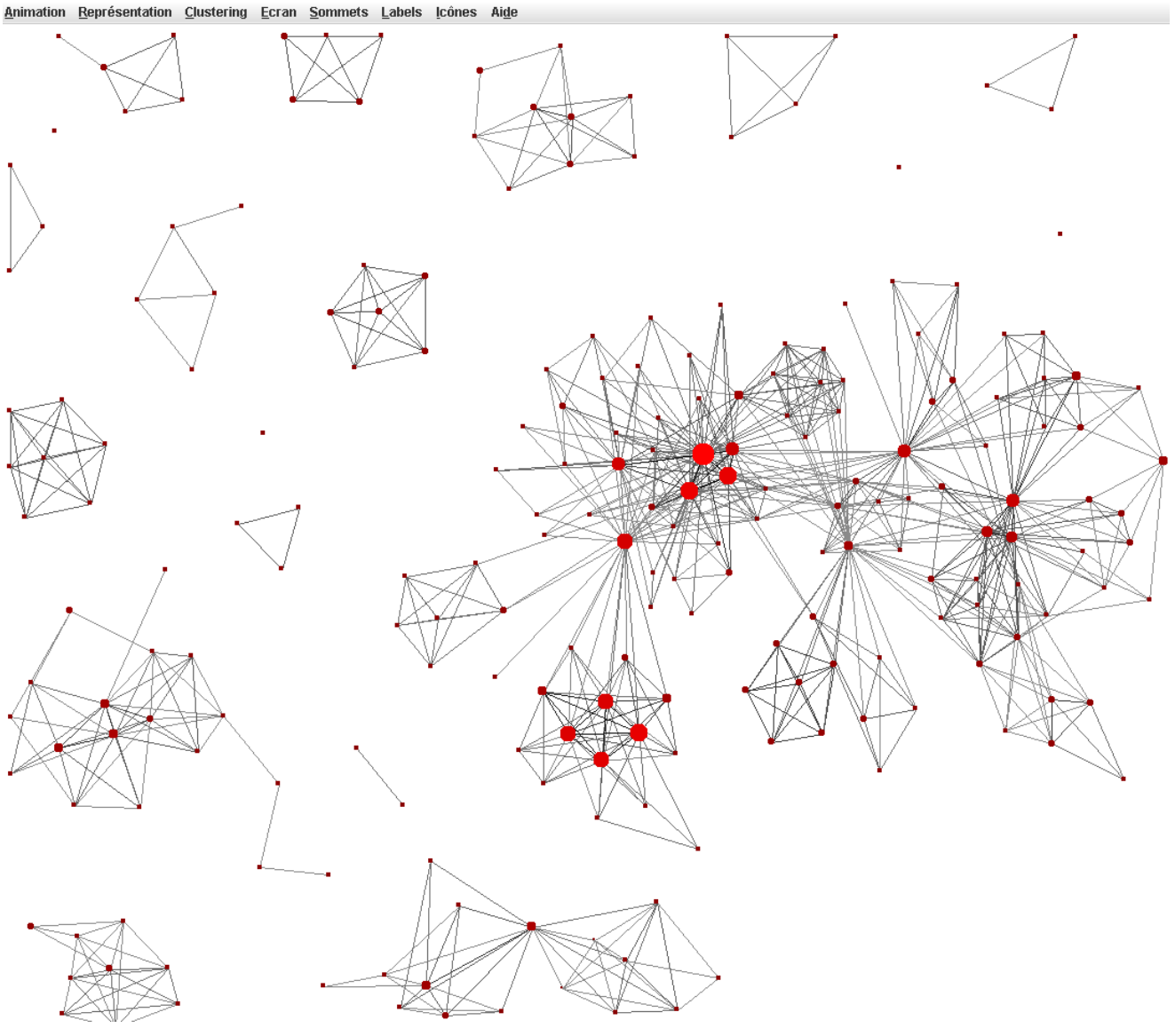

FIG. 5: Visualisation of author's collaborations.

Having thus identified the main network, we can now refer to the matrix that will allow to identify the players and also to monitor their evolution

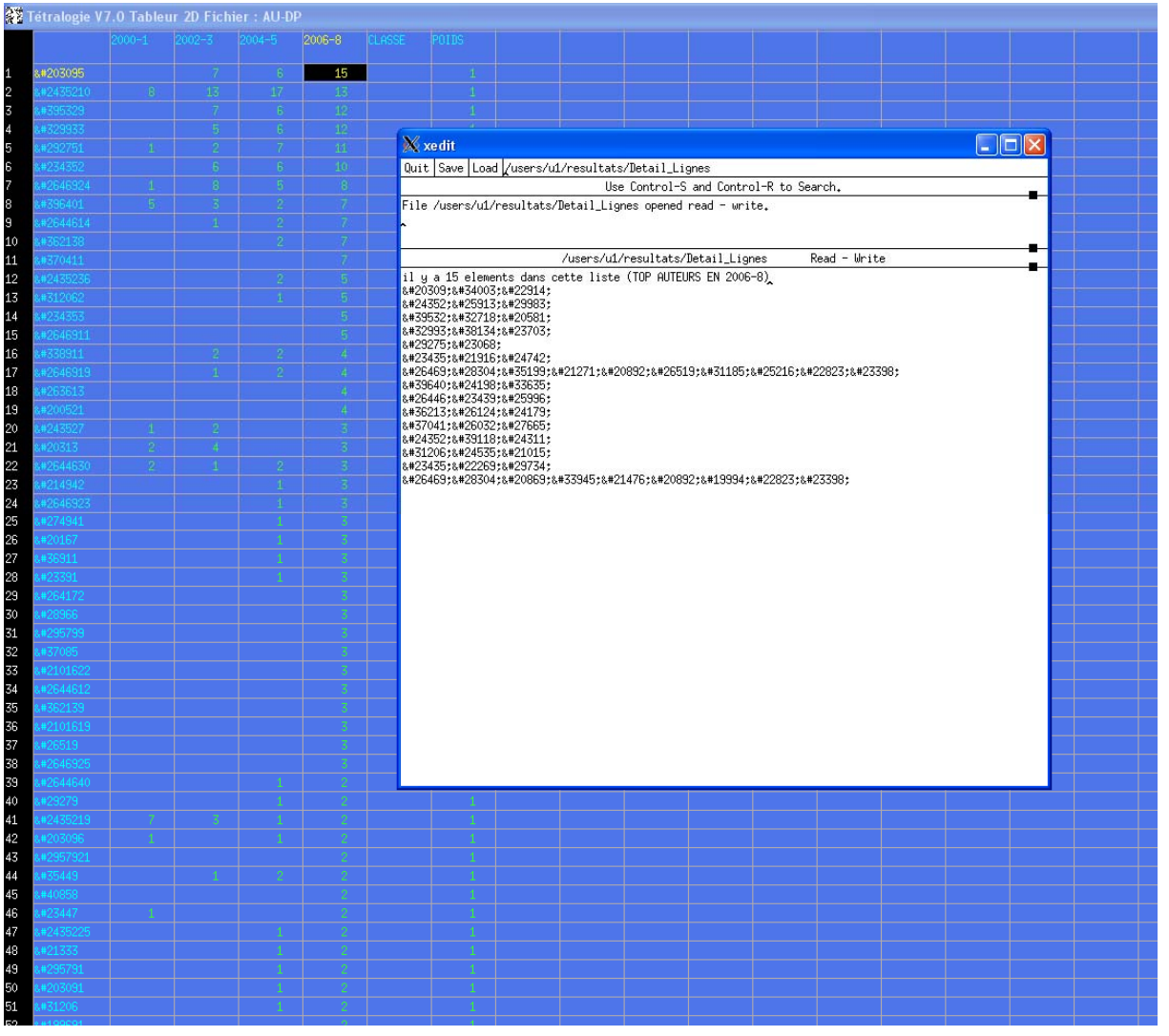

FIG. 6: Unicode visualisation of the name of the related author group.

By submitting the correspondence from Unicode to the Chinese characters we get the following names (Table 2):

TAB. 2: Correspondence Unicode / Chinese characters with pinyin translation

Unicode	Chinese	Pinyin translation
张改生	张改生	ZHANG Gaisheng
何蓓如	何蓓如	HE Beiru
马翎健	马翎健	MA JIanling
宋喜悦	宋喜悦	SONG Xiyu
牛娜	牛娜	NIU Na
高庆荣	高庆荣	GAO Qingrong
李宏斌	李宏斌	LI Hongbin
赵昌平	赵昌平	ZHAO Chanping
张风廷	张风廷	ZHANG Fengting
来源小麦遗传育种 国际学术讨论会	来源小麦遗传育种国际学术讨论会	International Symposium on wheat genetic and breeding.
秦志列	秦志列	QIN Zhilie
邱新民	邱新民	BING Xinmin
宋国琦	宋国琦	SONG Guoqi
来源内蒙古农业大学	来源内蒙古农业大学	Inner Mongolia agricultural university.

With this method, we could quickly identify the most Chinese researchers working in the field of hybrid wheat research. It will be easier for French decision-makers to conduct research on their behalf to be able to contact them then, to monitor their work accurately and possibly to enter into negotiations with these people.

We call for very special vigilance on the names of Chinese authors. Indeed, the Chinese surnames are few. The popular Chinese saying speaks about only one hundred Chinese family's names. If in fact the number of Chinese names is more than a hundred, it is still small, especially given the immensity of the Chinese population. One will therefore have to be very careful with regard to verification of the names so as not to confuse people. The family name is not enough, it is imperative to search the full name of the person. One will take extra precautions during a pinyin transcription of a Chinese name because it was then that the ambiguity will arise. It could eventually be useful to combine the search by name with a keyword. For example, the engine CNKI proposes keywords related to a given search. When launching a query with an author's name, other people names are given. Here are a few. (Table 3)

TAB. 3: Part of the list proposed by CNKI, for authors with similar names to the one originally sought.

张改	张改娥	张改红	张改慧
张改惠	张改兰	张改利	张改莲
张改连	张改玲	张改梅	张改娜
张改琴	张改芹	张改清	张改荣
张改生	张改侠	张改香	张改英

All these names start with "ZHANG Gai" and only the last character of each first name makes the distinction between the different people. Moreover, if it is clear, reading the Chinese language, that 张改莲 and 张改连 is not the same person, the last character of each name being different, this is far less clear in pinyin, the two names being transcribed "ZHANG Gai Lian". Similarly for 张改慧 and 张改惠, both are bearing the Chinese name "ZHANG Gai Hui" with a different character for the last phoneme "hui". Here appears an additional interest of the software Tetralogie that realise the analysis directly on the Chinese language without any translation, limiting thus any confusion.

2.4. Validation and comparison

To validate our results, we can verify the identity of the authors proposed above by the system. This article does not allow us to deepen each author; we propose to verify three authors taken at random from which we will dwell a little in order to ensure they match with the criteria of our research.

HE Beiru[2] :
Professor and director of research, involved since the 1970s in research on male sterility of wheat with three lines; Creator of several varieties of wheat and other triticales; Key member in the people's committee of Shaanxi Province and in the Chinese Academy of Sciences; Numerous awards for scientific excellence; Highly politically involved in the planning of the Chinese agricultural field crops; Testing of wheat at high altitude performance (in Tibet).

ZHAO Chanpin :
Director of the Research and engineering hybrid wheat centre, Beijing Academy of Agriculture and Forestry; Direction of genetic research on wheat and molecular biology; Research on termo-photo-sensitive factors of male sterility of wheat and on the improvement of wheat yield by two lines of reproduction; Study the DNA of wheat, database and germplasm creation of innovative new varieties, cloning; Numerous awards for scientific excellence and president of various government projects, including some from the Ministry of Agriculture and some from the Ministry of Science and Technology; part of the commissions of awards research grants; Involved in political decisions on food safety.

ZHANG Gaisheng
Member of the People's Consultative Conference of the Shaanxi Province; PhD in agricultural sciences, major in genetics and plant breeding in 1993 after studies in France, England and Switzerland; Post-doc at the North-west Agricultural University on the breeding of wheat; He currently teaches there as a professor and laboratory director at the centre selection and Biotechnology Yangling and at the national centre for the improvement of wheat yield; is also Executive Director of the Institute of Chinese culture and genetic resources, the editor of several scientific journals and received several prizes for his research on male sterility of wheat by means of molecular genetics and cellular. It is engaged in political programs concerning the development of science and food safety.

A short presentation of these authors has enabled us to validate their importance in research in Chinese wheat hybrid. The authors being proposed by Tetralogie are really key-characters at the national level, not only in terms of research but also at political level. Tetralogie has identified the actors in a simple way, while in the mass of articles; all authors do not have the weight as proposed.

One can go further in the validation of our approach, taking the example of the author ZHANG Gaisheng. If we run a query with his name on CNKI, we get 236 articles, including 19 on the year 2008. (Fig.7) (See the publication dates besides).

2008-07-15	2008-12-16	2008-11-10	2008-10-01	2008-09-15
2008-08-20	2008-08-15	2008-08-15	2008-07-25	2008-07-15
2008-06-15	2008-06-12	2008-06-10	2008-05-12	2008-04-20
2008-04-10	2008-03-10	2008-02-15	2008-01-15	

[2] We got these informations from Baidu Baike, the Chinese “wikipédia”. http://baike.baidu.com/

FIG. 7: Screenshot of the query about ZHANG Gaisheng on CNKI and the dates of its publications in 2008.

By searching with the name "ZHANG Gaisheng" by author on PubMed, we got no result (Fig. 8):

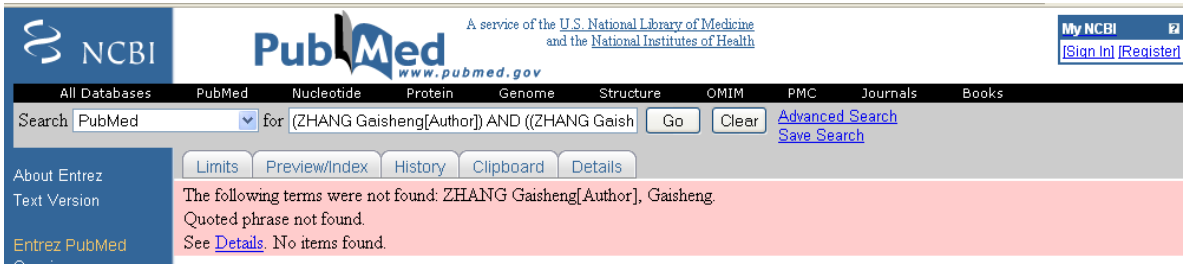

FIG. 8: Screenshot of the query about ZHANG Gaisheng on the PubMed database.

4 articles are available on the French database INIST but only the 2 first are really relevant concerning the author (fig. 9):

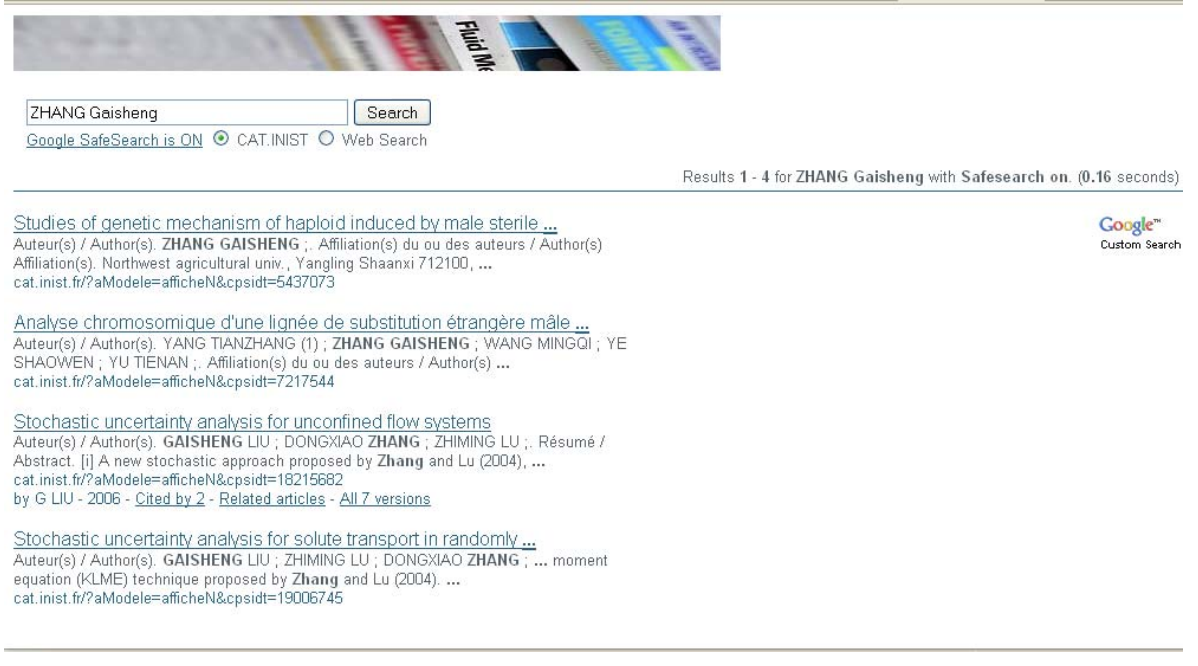

FIG. 9: Screenshot of the query about ZHANG Gaisheng on the INIST database.

Research on the year 2008 with Google Scholar engine has proposed two articles, the first one being referenced by Elsevier and the second by Wanfang data[3] (fig. 10).

FIG. 10: Screenshot of the query about ZHANG Gaisheng using Google scholar engine.

Finally, we add that the results provided by this analysis have effectively permitted to identify the key elements of the Chinese research in wheat hybrid. The content of this article does not allow detailing the entirety of the study that was conducted but we can say that this analysis has led a French company to approach major Chinese players in biotechnology research. We have seen that the areas of research, economics and politics in China were much more closely linked than in Western countries. A research partnership with a Chinese, even institutional, opens the door to market itself. This analysis provides policy makers a quick and an appropriate targeting of key players. Then it is the sensitivity of the negotiators who will be on the task.

[3] Wanfang data is a Chinese database for scientific articles. It is the main competitor for CNKI. It lists fewer stories than the latter but gives the advantage to the Chinese public to access to major international portals and databases, enabling it to retain a certain percentage of market shares on the Chinese market provider's information.

A more thorough study inevitably follows this analysis. Having identified some key authors, a selection of their articles can be carried out for translation. This phase of translation is situated only at the very final steps of the analysis and is specifically targeted. It is done on safe items.

3 Conclusion

In a competitive environment increasingly complex, organizations have the imperative need to acquire strategic information in record time. In a first stage of competitive watch, China is to be considered as a global entity, in order to determine its global involvement in a given sector of research. Then, it is important in a process of business intelligence to have a clear vision of dynamic networks of actors in terms of relational analysis to identify swiftly and surely the players to approach. Grasp the reality of the potential of the relationnal of an organization is a way to adjust its strategy and tactics and to deploy adequate tactics especially in the commercial field. [22]

A so large country has many national entities operating on the same market sector. We gave an example for identify the key players in agricultural biotechnologies and in particular wheat hybrid. The same approach could equally well have been applied to other market segments.

This presentation will permit the reader to become aware of the need to conduct active monitoring and analyzing relevant information directly extracted from the Chinese databases, bypassing the translation in a first step. The Western Web, including the specialized databases providing professional scientific information is not sufficient resources to collect information about China. It is reckless to make an analysis of the Chinese market without going through the sources of information in China. Deprive ourselves of the Chinese sources, is to deprive ourselves from a significant part of the scientific world.

The relevant information obtained in real time becomes a key factor of success in every strategic step or action and within the decision making process. This is true especially in a rapid growth market, where relations between individuals are more difficult to highlight. The software Tetralogie finds out in the analysis of the Chinese IST a new opening. It will assess the operational capabilities of China in general and a Chinese entity in particular, to suggest a strategy for action in the Chinese market.

The major benefit of this approach is that it is quickly applicable by any individual, even those who don't speak Chinese. In addition, the software Tetralogie coming out from the French public research, its approach arose in response to the statement by Mr. JUILLET said that "we have a terrible lack of tools from French or European origins." [23] The futures searches will focus on analyzing multi-sources corpus in Chinese language.

4 References:

[1] **CARAYON Bernard,** *Intelligence Economique, compétitivité et cohésion sociale*, Editions La Documentation Française, Paris, 2003.

[2] **DOU Henri**, *Veille Technologique et compétitivité : l'Intelligence Economique au service du développement industriel.* Ed. Dunod, Paris, 1995.

[3] **Gouvernement chinois**, site Web officiel, *China presents top awards to outstanding scientists*, 09-01-09. http://english.gov.cn/2009-01/09/content_1200919.htm Consulté le 26-01-09.

[4] **OST**, *Edition 2008 du rapport de l'Observatoire des Sciences et Techniques*, OST, Paris, 2008.
http://www.obs-ost.fr/dossiers/article/publication-de-ledition-2008-du-rapport-de-lost.html?tx_ttnews[backPid]=5&cHash=7008cb6c80 Consulté le 26-01-09.

[5] **OCDE**, *Perspectives de l'OCDE de la science, de la technologie et de l'industrie, éd. 2006,* OCDE, Paris, 2006. http://www.oecd.org/document/61/0,3343,fr_2649_33703_37743997_1_1_1_1,00.html Consulté le 26-01-09.

[6] **BUTLER D**., *China: The great contender*. Nature 454, http://www.nature.com/news/2008/080723/full/454382a.html, 23 July 2008.

[7] **ISTIC**, *2008 年中国和世界十大科技进展新闻评出 (2008 China and the world's top ten scientific and technological progress in selected news)* 2008-11-27.

http://www.chaxin.org/EducationDetail.aspx?ArticleID=86505 Consulté le 26-01-09.

[8] **PEREZ Alain**, *R&D : Pékin miné par la fuite des cerveaux*, Les Echos du 06-07-2007. http://www.chine-informations.com/actualite/chine-rd-pekin-mine-par-la-fuite-des-cerveaux_7468.html, Consulté le 26-01-09.

[9] **Gouvernement chinois,** Ministère de la Science et de la Technologie, *More scientific paper from China*, Newsletter n°531, 10-12-08.

http://www.most.gov.cn/eng/newsletters/2008/200812/t20081210_66158.htm Consulté le 26-01-09.

[10] **VILLALONGA André**, *La Chine se hisse dans le peloton de tête du classement des publications scientifiques*, ADIT, BE Chine 56, 8/01/2009.

http://www.bulletins-electroniques.com/actualites/57207.htm, Consulté le 26-01-09.

[11] **ZHOU Ping, LEVDESDORFF Loet**, *The emergence of China as a leading nation in science*. Research Policy, Volume 35, Issue 1, February 2006, pages 83-104.

http://users.fmg.uva.nl/lleydesdorff/ChinaScience/ChinaScience.pdf, Consulté le 26-01-09.

[12] **OCDE**, *Science, technologie et industrie : Perspectives de l'OCDE, édition 2008*, Paris, 2008. http://www.oecd.org/document/41/0,3343,fr_2649_34273_41564137_1_1_1_1,00.html, Consulté le 26-01-09.

[13] **QUOTIDIEN DU PEUPLE**, *La Chine dresse les grandes lignes d'un projet de développement de la bio-économie.* Quotidien du peuple. Le 28.06.2007

http://french.peopledaily.com.cn/Economie/6200702.html Consulté le 26-01-09.

[14] **DAVID Amos, SIDHOM Sahbi**, *Intégration de la démarche d'intelligence économique dans l'architecture fonctionnelle d'un système d'information.* Le système National d'information économique ; état et perspectives 2005. CERIST. Alger, Algérie.

[15] **CNNIC**, *Statistical Survey Report on the Internet Development in China*, « China Internet Network Information Center », Janvier 2008, Pékin, Chine.

http://www.cnnic.net.cn/uploadfiles/pdf/2008/2/29/104126.pdf, Consulté le 26-01-09.

[16] **ZHENG Shengli**, *L'incidence économique de la protection des bases de données en Chine*, dans Organisation mondiale de la propriété intellectuelle, Comité permanent du droit d'auteur et des droits connexes, septième session, Genève, 13-17 Mai 2002.

http://www.wipo.int/edocs/mdocs/copyright/fr/sccr_7/sccr_7_6.pdf , Consulté le 26-01-09.

[17] **MA Jiaji**, *« Bibliothèque et Document Numérique en Chine »*, note de synthèse pour le RTP-DOC, CNRS, Juin 2005.

[18] **Quotidien du peuple,** *La Chine dévoile un moteur de recherche des journaux académiques,* 12-10-2006.

http://french.people.com.cn/Sci-Edu/4910811.html, Consulté le 26-01-09.

[19] **DAVID Amos**, *Organisation des connaissances dans les systèmes d'information orientés utilisation – Contexte de veille et d'intelligence économique*, PU Nancy, Avril 2005.

[20] **DOUSSET Bernard**. *Intégration de méthodes interactives de découvertes de connaissances pour la veille stratégique*. HDR, Université deToulouse III, 2003.

[21] **LOUBIER Eloïse, BAHSOUN Wahiba, DOUSSET Bernard** *"La prise en compte de la dimension temporelle dans la visualisation de données par morphing de graphe"*. Dans : Colloque Veille Stratégique Scientifique et Technologique (VSST 2007), Marrakech, 21/10/2007-25/10/2007, IRIT, (support électronique), october 2007b.

[22] **BRUNEAU Jean-Maurice, MARCON Christian**. *Information stratégique informelle : le potentiel relationnel d'une organisation.* VSST 2006.

[23] **JUILLET Alain**, *Nous manquons cruellement d'outils informatiques d'origine française ou européenne*. 01 DSI n°10. Interview par N. ARPAGIAN.le 01-03-2005.

http://www.spyworld-actu.com/IMG/_article_PDF/article_232.pdf, Consulté le 26-01-09.

Figure list:

Table list:

Annexes :

Google Scholar BETA

"Male sterility gene" 2000 - 2009 Rechercher

Recherche avancée Scholar
Préférences Scholar
Aide Scholar

Rechercher sur le Web ○ Rechercher les pages en français

Scholar Tous les articles - Articles récents

Résultats **1** - **10** sur un total d'environ **938** pour **"Male sterility gene"**

Molecular mapping of a rice gene conditioning thermosensitive genic male sterility using AFLP, RFLP ...
NV Dong, PK Subudhi, PN Luong, VD Quang, TD Quy, ... - TAG Theoretical and Applied Genetics, 2000 - Springer
Page 1. Abstract The discovery and application of the thermo- sensitive
genic male sterility (TGMS) system has great potential for **...**
Cité 57 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 2 versions

Molecular mapping of a dominant genic **male sterility gene** Ms in rapeseed (Brassica napus)
GY Lu, GS Yang, TD Fu - Plant Breeding, 2004 - Blackwell Synergy
... Free Content. Full Text. Molecular mapping of a dominant genic **male sterility**
gene Ms in rapeseed (Brassica napus). GY Lu 1 1 National **...**
Cité 18 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 4 versions

Variation of female frequency and cytoplasmic **male-sterility gene** frequency among natural ...
K MURAYAMA, T YAHARA, T TERACHI - Molecular Ecology, 2004 - Blackwell Synergy
... Variation of female frequency and cytoplasmic **male-sterility gene** frequency among
natural gynodioecious populations of wild radish (Raphanus sativus L.). **...**
Cité 13 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 5 versions

... primer amplified region (ERPAR) marker linked to a dominant **male sterility gene** in cabbage (Brassica ...
X Wang, Z Fang, S Huang, P Sun, Y Liu, L Yang, M ... - Euphytica, 2000 - Springer
... 267 An extended random primer amplified region (ERPAR) marker linked to a dominant
male sterility gene in cabbage (Brassica oleracea var. capitata) **...**
Cité 13 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 3 versions

The Normal Function of a Speciation Gene, Odysseus, and Its Hybrid Sterility Effect - AONE Full Text @ MBLC

The Arabidopsis MALE STERILITY1 (MS1) gene is a transcriptional regulator of male gametogenesis, ...
ZA Wilson, SM Morroll, J Dawson, R Swarup, PJ ... - The Plant Journal, 2001 - Blackwell Synergy
... References. • Aarts, MGM, Dirkse, WG, Stiekema, WJ, Pereira, A. (1993). Transposon
tagging of a **male sterility gene** in Arabidopsis. Nature, 363, 715–717. **...**
Cité 118 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 5 versions

Molecular mapping of the reverse thermo-sensitive genic male-sterile gene (rtms1) in rice
JH Jia, DS Zhang, CY Li, XP Qu, SW Wang, V ... - TAG Theoretical and Applied Genetics, 2001 - Springer
... Meeting in China", P37, Dalian, China Koh HJ, Son YH, Heu MH, Lee HS, McCouch SR
(1999) Molecu- lar mapping of a new genic **male-sterility gene** causing chalky **...**
Cité 46 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 2 versions

Nuclear expression of a cytoplasmic **male sterility gene** modifies mitochondrial morphology in yeast ...
Y Duroc, C Gaillard, S Hiard, C Tinchant, R ... - Plant Science, 2006 - Elsevier
... reserved. Nuclear expression of a cytoplasmic **male sterility gene** modifies
mitochondrial morphology in yeast and plant cells. Yann **...**
Cité 12 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 2 versions

Fine mapping of the rice thermo-sensitive genic male-sterile gene tms5 - ▶ biovip.org [PDF]
YG Wang, QH Xing, QY Deng, FS Liang, LP Yuan, ML ... - TAG Theoretical and Applied Genetics, 2003 - Springer
... Dalian, China, p 37 Koh HJ, Son YH, Heu MH, Lee HS, McCouch SR (1999) Molecular
mapping of a new genic **male-sterility gene** causing chalky endosperm in rice **...**
Cité 33 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 5 versions

Hybrid seed production and the challenge of propagating male-sterile plants
E Perez-Prat, MM van Lookeren Campagne - Trends in Plant Science, 2002 - Elsevier
... the conversion of a pro-herbicide into a herbicide only in male reproductive tissues
[5, 6, 7 and 8], or by engineering the **male sterility gene** in such a way **...**
Cité 34 fois - Autres articles - Recherche sur le Web - Importer dans BibTeX - Les 5 versions

Auteurs clés: **B Wang** - **H Nguyen** - **D Page** - **Y Tao** - **N Dong**

Gooooooooooogle ▶

Page de résultats: **1** 2 3 4 5 6 7 8 9 10 **Suivant**

Same query as above with the Google Scholar engine with the key words « male sterility gene »in Chinese realised on the 09-01-09.

Google Scholar BETA "雄性不育基因" 2000 - 2009 Rechercher
Recherche avancée Scholar
Préférences Scholar
Aide Scholar
Rechercher sur le Web Rechercher les pages en français

Scholar Tous les articles - Articles récents — Résultats **1** - **10** sur un total d'environ **1 320** pour **"雄性不育基因"** (**0,12** secondes)

水稻野败型细胞质雄性不育基因的ISSR和SSLP标记分析
景润春, 朱英国 - 中国农业科学, 2000 - cqvip.com
@tO-中国农业科学2000, 33(2): l0～l5 Scientia Agricu]tura Sinica
水稻野败型细胞质雄性不育恢复基因的ISSR和SSLP标记分析彤 ...
Cité 15 fois - Autres articles - Recherche sur le Web

玉米雄性不育基因(ms30)的RFLP作图
梁业红, 周洪生 - 作物学报, 2000 - cqvip.com
, 21a 第26卷第3期2000年5月作物学报ACTA AGRONQM IcA SIN IcA VoL 26, NOo 3 M ay, 2000 玉米雄性不育基因(ms如)的RFLP作图s ;. 口狐J ...
Cité 12 fois - Autres articles - Recherche sur le Web

一个用于甘蓝显性雄性不育转育辅助选择的SCAR标记
王晓武, 方智远 - 园艺学报, 2000 - cqvip.com
... 北京100081 方 智远 中国农业科学院蔬菜花卉研究所,北京100081 SCAR
显性雄性不育基因 甘蓝 分子标记辅助选择 2000 027 002 143 ...
Cité 15 fois - Autres articles - Recherche sur le Web

萝卜胞质大白菜雄性不育系的生化分析
孙日飞, 方智远 - 园艺学报, 2000 - cqvip.com
... carotenatl in anthers ofOgura CM S (ms／s P) *表示t具i险5%差异显著水平。
T-test s'fieant at 5任level 3 讨论植物雄性不育基因在表达 ...
Cité 21 fois - Autres articles - Recherche sur le Web

大葱(Allium fistulosumL.)胞质雄性不育基因的RAPD标记
蔷树鹏, 孟祥栋 - 农业生物技术学报, 2002 - cqvip.com
农垂生物技术学报,lotmaal 0fA · 研究报告· 大(A／／i~
fistulosumL.)胞质雄性不育基因的RAPD标记蔷树鹏孟祥栋 ...
Cité 10 fois - Autres articles - Recherche sur le Web - Les 2 versions

青麻叶结球白菜雄性不育系的转育
闻凤英, 宋连玖, 王玉龙, 刘晓辉, 赵冰, 丘玉秀, 期刊 - 园艺学报, 2001 - scholar.ilib.cn
... 不育系3A作为不育源, 以香麻叶材料黑227为目标亲本, 经过杂交、
自交、兄妹交、测交等转育手段, 将雄性不育基因转育 ...
Cité 11 fois - Recherche sur le Web

属间体细胞杂交创建甘蓝型油菜细胞质雄性不育系及其鉴定
胡琼, 李云昌, 梅德圣, 方小平, LN Hansen, SB ... - 中国农业科学, 2004 - cqvip.com
... 4～6代的不育单株中发现了2亲本线粒体的重组[21]。因而Nsa雄性不育
的遗传决定因素(即细胞质雄性不育基因)有2种可能来源 ...
Cité 17 fois - Autres articles - Recherche sur le Web - Les 2 versions

一个与甘蓝显性雄性不育基因连锁的RFLP标记
刘玉梅, 方智远, MD McMullen, 庄木, 杨丽梅, 王晓武, ... - 园艺学报, 2003 - cqvip.com
园艺学报2003, 30(5): 549 553 Aam Hoaieulan'ae Sim'en 一个与甘蓝显性雄性
不育基因连锁的RFLP标记刘玉梅方智远Michael D. McMullen2 ...
Cité 7 fois - Autres articles - Recherche sur le Web

Auteurs clés: **方智远** - **王晓武** - **朱英国** - **孙日飞** - **凌杏元**

Goooooooooogle ▶
Page de résultats: 1 2 3 4 5 6 7 8 9 10 Suivant

"雄性不育基因" Rechercher

Accueil Google - À propos de Google - À propos de Google Scholar

©2009 Google