

COTON *Doc*: an encyclopaedic software tool for cotton pest control



Cotton pest and disease control has a substantial economic impact that often overshadows the cost-effectiveness of the crop. COTON *Doc* (on CD-ROM) is a multimedia system presenting a broad range of information on cotton and its pests in French-speaking sub-Saharan Africa.

The urgent need to improve cotton pest and disease control in tropical Africa (CAUQUIL & VAISSAYRE, 1994) prompted the Annual Crops Department at the Centre de coopération internationale en recherche agronomique pour le développement (CIRAD-CA, France) to develop a software program to assist in identifying cotton pests and diseases.

A pilot program, DIACOT, was developed in 1991, but was limited by the performance potential of the computers available at that time. The remarkable computer progress since then (colour display, wide use of the Windows interface, high storage capacity with CD-ROM), has provided new opportunities. A highly documented, user-friendly software program, COTON *Doc*, was thus developed.

This practical tool, which assembles entomology/plant pathology research results from 14 concerned countries, was designed to address the needs of people specifically involved in the cotton sector. It enables the user to identify various causes of cotton crop damage. Different means of control (biological, chemical, etc.) are proposed, along with integrated cotton protection programmes,

which are inexpensive and environment-friendly. COTON *Doc* was developed jointly with the Association des universités partiellement ou entièrement de langue française — université des réseaux d'expression française (AUPELF-UREF, Canada).

A practical documentary information tool

COTON *Doc* is divided into four modules that can be accessed from the opening menu:

- cotton plant;
- cotton pests and diseases;
- control techniques;
- countries.

Information in each module is presented in a clear, user-friendly form. Users are guided in their search in order to facilitate their queries, provide them with direct access to required information or allow them to browse through general information on the topic. The program thus manages 1 500 pages of text, 480 colour photos, 180 bibliographical references, cotton statistics for the different countries and a glossary of more than 450 definitions.



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Cotton plant

The "cotton plant" module provides details on botanical classification, morphology, physiology and cotton cropping. Topics are proposed under each heading, e.g. "flowers" under the "morphology" heading, illustrated with full-screen colour photos (Figure 1).

Cotton pests and diseases

This is the largest module of the program. It provides the data required to identify various causes of crop damage: pests, diseases,

shortages, toxicity, climatic variations, etc. Precise functional information is given for each situation:

- scientific and common names, systematic classification;
- geographical distribution in the chosen zone (which can be expanded upon in the "country" module);
- summarized description of the biology and types of damage caused;
- attacked parts of the cotton plant;
- harmful potential;
- control techniques;
- full-screen colour photos;
- monographs on the most important pests and diseases.

Users can query any of these points by selecting a pest or disease from a list of scientific or common names, or by using a COTON Doc diagnostic aid. It is also possible to be simply guided stepwise by the program to the likely origins of a problem through responses to a set of questions on the type of symptoms observed (illustrated by rough drawings).



Figure 1. Full-screen colour photos.



Figure 2. Identifying the cause of damage.

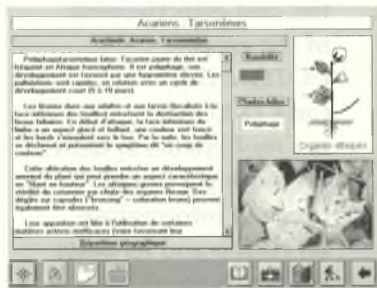


Figure 3. Browsing through information on a cotton pest.

Identifying the cause of damage

The user is asked a series of multiple-choice questions illustrated by simple drawings of, for instance, possible types of damage on different plant parts (Figure 2). There are sometimes several pathways leading to the response, since some pests and diseases can express different symptoms. Moreover, some types of damage can have several different causes.

When the "routing" icon on the lower right (symbolized by three footsteps) is clicked, the itinerary followed is displayed, along with a list of further possible causes. The user can then return to the original query of request information on one of the possible causes from the list (Figure 3), or click on the camera icon to display photos of symptoms for comparison with those observed in the field (Figure 4).

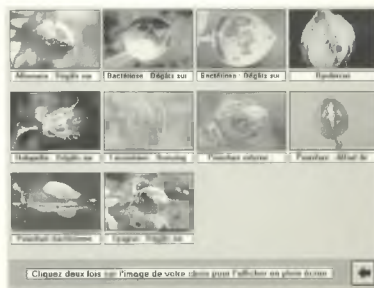


Figure 4. A display of symptoms.

During the diagnosis, the user can browse through the list of responses and different possible causes and display photos of the corresponding symptoms. This module is very flexible, almost game-like, making it accessible to users from almost any field.

Control techniques

The concepts and terms used are defined and then different components of an integrated control programme are described:

- supervised chemical control (active ingredients, treatment techniques and schedules);
- biological control (natural enemies and techniques);
- resistance traits in different cotton varieties;
- etc.

Active ingredients that can be used to control cotton pests and diseases are listed, along with their characteristics (toxicity, modes of action). Treatment programmes and techniques are presented, briefly discussed and illustrated.

An important section focusing on beneficial organisms (predators, parasitoids and pathogens; their involvement, hosts and preys) provides practical means for diversifying cotton pest and disease control programmes.

Countries

For each of the 14 cotton-producing countries concerned, *COTON Doc* proposes:

- maps of the cotton cropping zone on different scales;
- the main participants involved in the cotton sector;
- cotton production statistics (graphs);
- a list of the main pests;
- a monograph on cotton pest and disease control, when available.

The schedule and pest infestation levels are presented (graphs) alongside the cotton growth cycle, so that the user can get a rapid overview of the

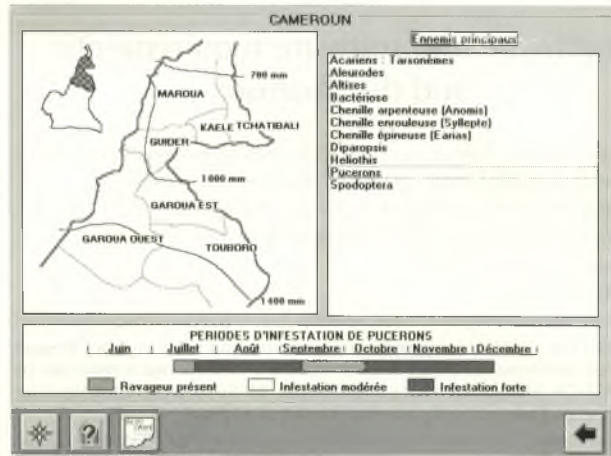


Figure 5. Overview of the cotton pest and disease spectrum in a country.

cotton pest and disease spectrum for the country (Figure 5).

The bibliographical references, including abstracts, can be accessed through different modules. The glossary can be queried directly from the displayed texts (by double-clicking on any word with the mouse) or from the "glossary" menu.

Querying COTON Doc

COTON Doc does not require any special computer skills. The different choices are symbolized on the screen by readily identified sensitive zones, or "icons", that can be picked by a single click with the mouse (Figure 6). All information displayed on the screen, except photos, can be printed.

Conclusion and prospects

COTON Doc is the first encyclopaedic software program produced by CIRAD on CD-ROM. This high performance, computer-generated tool on integrated cotton pest and disease control has a large storage

capacity, i.e. equal to that of 500 diskettes. It is accessible to a wide range of users thanks to its user-friendliness, extensive possibilities, full bibliography (especially on beneficial fauna), and its photo library. Some of the data managed by *COTON Doc* are open-ended (production statistics, active ingredients, etc.). They will be updated about every 2 years.

Finally, English and Spanish versions of the program are planned. They will be designed for English-speaking Africa and Latin America, and adapted to the cotton pest and disease situations in these regions.

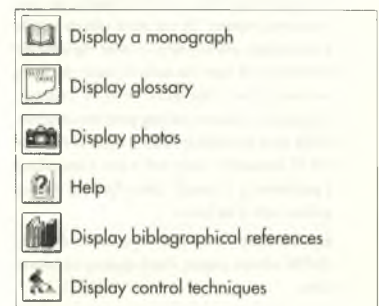


Figure 6. Definitions of some icons.

Hardware and software requirements and distribution

The following computer hardware and software are required to operate COTON *Doc*:

- a PC (IBM-compatible) computer (with a 386 microprocessor or better);
- 4 megabytes RAM (8 megabytes preferred for increased rapidity);
- 3 megabytes free on the hard disk to install the program;
- a VGA screen (256-colour display)
- a CD-ROM disk drive;
- a Windows interface (version 3.1) and mouse.

The COTON *Doc* CD-ROM comes with a user's manual and a publication by J. Cauquil "Cotton Pests and Diseases in Africa South of the Sahara". The package is distributed by the CIRAD-CA (SPID) Publishing Department, BP 5035, 34032 Montpellier Cedex 1, France. Phone: (33) 67 61 59 18. Fax: (33) 67 61 59 21.

For readers logging on to Internet, a demonstration copy of COTON *Doc* can be accessed through the World Wide Web (WWW) server of CIRAD. The Uniform Resource Locator (URL) connection is: <http://www.cirad.fr>.



Bibliography

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CAUQUIL J., VAISSAYRE M., 1994. Protection phytosanitaire du cotonnier en Afrique tropicale. 1- Nouvelle politique de protection et choix des pesticides. Agriculture et développement, 3 : 13-23.

Abstract... Resumen... Résumé

B. GIRARDOT – COTON *Doc*: an encyclopaedic software tool for cotton pest control.

COTON *Doc* is an encyclopaedic software program on cotton and cotton pests in French-speaking sub-Saharan Africa. This user-friendly tool manages integrated cotton crop protection information in a clear format that includes texts (1500 pages), colour photos (480), bibliographical references (180) and definitions (450). It is divided into four modules on cotton plants, cotton pests, integrated pest control and the 14 cotton-producing countries concerned. The program also includes a step-by-step practical module with graphic illustrations to assist in pinpointing the cause of observed symptoms. This educational software provides a wide audience with easy access to cotton crop protection information and meets the needs of people specifically involved in the cotton sector: research scientists, development technicians and crop protection companies. COTON *Doc* is distributed by CIRAD. It comes on a CD-ROM (for PC computers), along with a user's manual and a publication by J. Cauquil "Cotton Pests and Diseases in Africa South of the Sahara".

Keywords: cotton, disease, pest, crop protection, diagnosis, CD-ROM, software program, French-speaking sub-Saharan Africa.

B. GIRARDOT – COTON *Doc*: una nueva herramienta para dirigir la lucha contra los enemigos del algodón.

COTON *Doc* es un software enciclopédico relativo al algodón y sus enemigos en África de habla francesa del sur del Sahara, que administra de manera fácil y clara las informaciones necesarias para la protección fitosanitaria integrada del algodón, en forma de textos (1500 páginas), fotos a color (480), referencias bibliográficas (180) y definiciones (450). Este programa está constituido por cuatro módulos consagrados a la planta, sus enemigos, la lucha integrada y los catorce países algodoneros considerados, además de un módulo práctico de ayuda a la identificación del origen de los síntomas observados, que incluye ilustraciones y procede por etapas. Su sencillez de empleo y su carácter didáctico lo hace accesible para un vasto público y su contenido responde a las expectativas de los actores del sector algodonero: investigadores, técnicos del desarrollo y sociedades fitosanitarias. COTON *Doc* es difundido por CIRAD y se entrega en CD-ROM (para compatibles IBM-PC) con un manual de instrucciones y la obra de J. CAUQUIL "Enfermedades y plagas del algodón en África del sur del Sahara".

Palabras clave: algodón, enfermedad, plaga, protección fitosanitaria, diagnóstico, CD-ROM, software, África de habla francesa del sur del Sahara.

B. GIRARDOT – COTON *Doc*: un nouvel outil pour gérer la lutte contre les ennemis du cotonnier.

COTON *Doc* est un logiciel encyclopédique sur le cotonnier et ses ennemis en Afrique francophone sub-saharienne. Il gère de façon conviviale et claire les informations nécessaires à la protection phytosanitaire intégrée du cotonnier, qu'il réunit sous forme de textes (1 500 pages), de photos en couleurs (480), de références bibliographiques (180) et de définitions (450). Il est composé de quatre modules consacrés à la plante, ses ennemis, la lutte intégrée et les quatorze pays cotonniers concernés. Le logiciel comprend un module pratique d'aide à l'identification de l'origine des symptômes observés, illustrés par des graphiques et procédant par étape. Sa simplicité d'emploi et son caractère didactique le rend accessible à un large public et son contenu répond aux attentes des acteurs de la filière cotonnière : chercheurs, techniciens du développement et firmes phytosanitaires. COTON *Doc* est diffusé par le CIRAD. Il est livré sur CD-ROM (pour micro-ordinateur compatible IBM-PC), accompagné du mode d'emploi et de l'ouvrage de J. CAUQUIL « Maladies et ravageurs du cotonnier en Afrique au sud du Sahara ».

Mots-clés : cotonnier, maladie, ravageur, protection phytosanitaire, diagnostic, CD-ROM, logiciel, Afrique francophone sub-saharienne.