

**Utilization of Expert Systems in Agricultural Research and Production**  
**A regional Specialized Training Course**  
**Aleppo, Syria 5-16 November 2006**

**Introduction**

An expert system can be defined briefly as a computer program that simulates the human expert in solving a problem in a narrow domain area. These systems are different from traditional software in the sense that they deal with a symbolic knowledge base, not a database or mathematical models. However, they can be integrated with traditional software to form a complete system if needed. More elaboration will be given in the course to clarify the concepts of expert systems.

Expert systems have been used in agriculture since the early 1980s. Several systems have been developed in different countries including the USA, Europe, and Egypt for plant-disorder diagnosis, management and other production aspects.

This course will be jointly conducted by the International Center for Agricultural Research in the Dry Areas (ICARDA) and the Central Laboratory for Agricultural Expert Systems (CLAES) of the Agricultural Research Center (ARC), Ministry of Agricultural and Land Reclamation, Egypt. During the period of 1997-2005, eight introductory courses were organized to introduce the Expert Systems technology to senior and mid-level decision-makers in agricultural institutes of the Central and West Asia and North Africa (CWANA). After the first five years of joint efforts, a follow-up workshop was held in 2002 to assess the impact of this course. The recommendations of this important workshop were to continue organizing this course.

This course will concentrate on issues related to the design and implementation of Expert Systems for specific agriculture tasks. In CLAES, a set of Expert System building tools were implemented to promote rapid system development by agricultural researchers and other users. These new tools will be used in developing Expert Systems during the course.

**Course Objectives**

At the end of this course, the participants should be able to:

- Recognize the basic components of Expert System and its characteristics,
- Identify the development life cycle of an Expert System,
- Design Expert Systems for selecting varieties, diagnosing pests, and controlling pests using the newly developed CLAES methodology and tools.
- Use agricultural Expert Systems tools developed in CLAES to develop an experimental prototype Expert System

**Course Description**

This course introduces the basic components of an expert system and how it differs from other types of software programs such as databases and simulation modeling. The development life-cycle phases, namely: knowledge acquisition, knowledge analysis and modeling, requirement specifications, design, implementation, verification, validation, evaluation, maintenance, and training, will be described briefly. The participants will be

trained on how to develop variety selection, disorder diagnosis, and pest control expert systems using the knowledge acquisition tools and the generic web expert system development tools.

### Course Program

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#### Day 1: Sunday Nov. 5, 2006

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 09:00	Registration
09:00 — 09:30	Course Opening
<b>09:30 — 10:00</b>	<b>Coffee break</b>
10:00 — 10:30	ICARDA Audio Visual Presentation
10:30 — 12:30	Introduction to Expert Systems
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	Expert System Development Life Cycle
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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#### Day 2: Monday Nov. 6, 2006

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	Presentation of a Typical Variety Selection Expert System
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	How to Develop an Expert System for Variety Selection using CLAES Methodology
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	<ul style="list-style-type: none"><li>• Formation of Working Groups for Variety Selection Projects</li><li>• Working Groups Conduct Knowledge Acquisition Session (I) for a Variety Selection Expert System Guided by the Presented Methodology</li></ul>
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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#### Day 3: Tuesday Nov. 7, 2006

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	<i>Working Groups Conduct Knowledge Acquisition Session (II) for Variety Selection Expert System Guided by the Presented Methodology</i>
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	<i>Working Groups Implement the System Using the Variety Selection Building Tool – Session (I)</i>
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	<i>Working Groups Implement the System Using the Variety Selection Building Tool – Session (II)</i>
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 4: Wednesday Nov. 8, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	<i>Working Groups Test and Verify the System</i>
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	<i>Working Groups Present Projects</i>
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	Presentation of a Typical Disorder Diagnosis Expert System
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 5: Thursday Nov.9, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	How to Develop an Expert System for Disorder Diagnosis using CLAES Methodology
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	Formation of Working Groups for Disorder Diagnosis Projects
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	Working Groups Conduct Knowledge Acquisition Session (I) for a Disorder Diagnosis Expert System Guided by the Presented Methodology
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 6: Friday Nov.10, 2006**

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09:00 — 17:00	Recreational and Field Trip
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**Day 7: Saturday Nov.11, 2006: Week End**

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**Day 8: Sunday Nov. 12, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	Working Groups Conduct Knowledge Acquisition Session (II) for Disorder Diagnosis Expert System Guided by the Presented Methodology
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	Working Groups Implement the Designed System Using the Disorder Diagnosis Building Tool – Session (I)
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	Working Groups Implement the Designed System Using the Disorder Diagnosis Building Tool – Session (II)
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 9: Monday Nov. 13, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	<i>Working Groups Test and Verify the System</i>
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	<i>Working Groups Present Projects</i>
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	<i>Presentation of a Typical Pest control Expert System</i>
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 9: Tuesday Nov. 14, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	How to Develop an Expert System for Pest control using CLAES Methodology
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	<ul style="list-style-type: none"> <li>• Formation of Working Groups for Pest control Projects</li> <li>• Working Groups Conduct Knowledge Acquisition Session (I) for a Pest control Expert System Guided by the Presented Methodology</li> </ul>
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	Working Groups Conduct Knowledge Acquisition Session (II) for a Pest control Expert System Guided by the Presented Methodology
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 10: Wednesday Nov. 15, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:30	<i>Working Groups Implement the Designed System Using the Pest control Building Tool – Session (I)</i>
<b>10:30 — 11:00</b>	<b>Coffee Break</b>
11:00 — 12:30	Working Groups Implement the Designed System Using the Pest control Building Tool – Session (II)
<b>12:30 — 13:30</b>	<b>Lunch Break</b>
13:30 — 15:00	Working Groups Test and Verify the System
15:00 — 15:30	Transportation from Tel Hadya to Aleppo

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**Day 11: Thursday Nov. 16, 2006**

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08:00 — 08:30	Transportation from Aleppo to Tel Hadya
08:30 — 10:00	<i>Working Groups Present Projects</i>
<b>10:00 — 10:30</b>	<b>Coffee Break</b>
10:30 — 11:30	<i>Wrap up Discussion</i>
11:30 — 12:30	Closing Ceremony and Distribution of Certificates
12:30 — 13:30	<b>Lunch Reception</b>
13:30 — 14:00	Transportation from Tel Hadya to Aleppo & Departure

### **Who Should Apply?**

Senior- and mid-level decision makers in agricultural institutes and organizations who need to understand the benefits of Expert Systems technology for agricultural research and production.

### **Prerequisites**

To ensure maximum benefit from the course, nominees should have:

- basic experience in agricultural research/production
- basic experience in use of personal computers and Windows operating system
- proficiency in oral and written English

### **Selection Procedure**

Candidates will be selected on the bases of their qualifications and work experience. The completed application form, with all the required support documents, should be received by ICARDA not later than 20 August 2006. The relevant authorities will be informed if the candidate has been accepted.

### **Terms and Conditions of the Award**

The training award will provide financial support during the course, including international and local travel, accommodation, a modest per diem as stated in ICARDA's training policy, medical and accidental death/injury insurance. Self-financed applicants are encouraged to apply. Awards are granted to training participants only and supplementary provisions for the participant's family are not provided.

### **Application Procedures**

The attached application form should be completed and submitted by the authority of the concerned national program. The candidates should also provide two passport-size photographs

### **About CLAES**

Based at the Agricultural Research Center in Cairo, the Central Laboratory for Agricultural Expert Systems (CLAES) is helping farmers in Egypt to optimize the use of resources and maximize food production through the development, implementation and evaluation of knowledge-based decision support systems.

The objective of CLAES are to:

- Develop agricultural Expert Systems for commodities and disciplines economically important to Egypt
- Train extension officers and farmers to use the developed Expert Systems
- Maintain the developed expert systems by continuously updating the database
- Design tools to enhance the productivity of the knowledge engineers in building agricultural Expert Systems
- Enhance performance of agricultural extension personnel
- Evaluate, update and improve the efficiency of developed Expert systems
- Use Expert Systems to reduce the time it takes to solve problems and perform routine tasks, thus freeing experts for more important work
- Help increase food production per unit area

- Make farmers more efficient and profitable

### **About ICARDA**

Established in 1977, the International Center for Agricultural Research in the Dry Areas (ICARDA) is one of the 16 centers supported by the CGIAR. ICARDA'S mission is to improve the welfare of poor people through research and training in dry areas of the developing world by increasing the production, productivity and nutritional quality of food, while preserving and enhancing the natural resource.

ICARDA serves the entire developing world for the improvement of lentil, barley and faba bean; all dry-area developing countries for the improvement of on-farm water-use efficiency, rangeland and small-ruminant production; and the Central and West Asia and North Africa region for the improvement of bread and durum wheat, chickpea, pasture and forage legumes and farming systems. ICARDA's research provides global benefits of poverty alleviation through productivity improvements integrated with sustainable natural-resource management practices. ICARDA meets this challenge through research, training, and dissemination of information in partnership with the national regional and international agricultural research and development systems.

The results of research are transferred through ICARDA's cooperation with national and regional research institutions, with universities and ministries of agriculture, and through the technical assistance and training that the Center provides. A range of training programs is offered extending from residential courses for groups to advanced research opportunities for individuals. These efforts are supported by seminars, publications, and specialized information services.

**Please send the completed application form to:  
Human Resources Development Unit**

**ICARDA**

**P.O. Box 5466**

**Aleppo, Syria**

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