



المركز الوطني للبحوث الزراعية
National Agricultural Research Center



Cochineal Scale on Cactus: Threats and Integrated Pest Management

Zoom Meeting

In collaboration between:

the National Agricultural Research Center

University of Jordan and

The International Center for Agriculture Research in the Dry
Areas (ICARDA)

August 18, 2020

Cochineal Scale on Cactus: Threats and Integrated Pest Management

Zoom Meeting minutes



The poster features the ICARDA logo on the left and the NARC logo on the right. The text is centered and reads: "يتشرف مدير عام المركز الوطني للبحوث الزراعية وبالتعاون مع المركز الدولي للبحوث الزراعية في المناطق الجافة (إيكاردا) بدعوتكم لحضور ورشة العمل الإقليمية بعنوان 'الحشرة القشرية القرمزية على نبات الصبار: المخاطر وسبل المكافحة المتكاملة' 'Cochineal Scale on Cactus: Threats and Integrated Pest Management' وذلك يوم الثلاثاء الموافق ٢٠٢٠/٧/١٨ في تمام الساعة الثالثة بتوقيت الأردن عبر تطبيق ZOOM".

Meeting minutes

The meeting started with a welcoming note by **Dr. Nizar Hadad** who valued the fruitful ICARDA - NARC collaboration. He mentioned that this meeting is to draw a road map to control the spread of cochineal threatening cactus production in Jordan. **Dr. Sawsan Hassan** from ICARDA welcomed the participants and described the importance of tackling the issue of cochineal as a hot topic that requires prompt action in order to control it or at least slow down its spread. She introduced the key speakers and asked Dr. El-Bouhssini to share the Moroccan experience regarding cactus cochineal control.

Dr. Mustapha El-Bouhssini (ICARDA Entomologist) welcomed the participants and wished success for the workshop. He stated that the cactus Cochineal scale, *Dactylopius opuntiae*, (wild cochineal) is very dangerous. It is different from the cochineal red Dye insect *Dactylopius coccus*, which is rich in carminic acid, this dye is extracted from the body of insect that lives on the cladodes. Nevertheless, and despite the danger of this the wild cochineal has been/is still used as biological control agent of several *Opuntia* species that are considered invasive in some countries such as Australia, South Africa and Saudi Arabia. This insect is very dangerous and can kill the cactus plant in less than 6 months. Dr. El-Bouhssini spoke about the Moroccan experience with wild cochineal. The cochineal scale insect appeared in Morocco for the first time the end of 2014. Unfortunately, in 6 years more than 65% of cactus plantation in Morocco has been destroyed as a result of this pest.

In 2016, a joint team of scientists from ICARDA, the National Institute of Agricultural Research (INRA) and the Moroccan Ministry of Agriculture agreed on a national program to tackle this issue including:

I. Emergency program

1. Remove (burn or bury) heavily infested cactus plantations
 2. Spraying low to medium infestation plantations using authorized/registered pesticides in the country.
- At the beginning, there was no pesticide registered for this pest in Morocco. The Plant protection organization (ONSSA) personnel worked very hard and they were successful in identifying and registering more than a dozen so far.

Recommendation for Jordan: Plant Protection Directorate needs to test some of the pesticides to evaluate their effectiveness on *Dactylopius opuntiae* under Jordanian conditions.

II. Research Program

After it was confirmed that the infection is related to the wild cochineal, INRA and ICARDA established a research program since 2016 and the following action were taken:

1. A survey and a distribution map was conducted in Morocco.
2. Biological control:

Since the origin of this insect is Latin America/Mexico the best is to introduce natural enemies from this country. Unfortunately, we didn't succeed to import these enemies. Yet, the following action took place:

- a. Survey to identify the natural enemies
- b. Test predator species (*Cryptolaemus montrouzieri*) which is already used in Morocco for the management of a citrus cochineal for its efficacy against the cochineal. This Australian predator was introduced to Morocco long time ago. The Lab results of this species against the cactus cochineal were very promising, but field tests have not been that successful yet.



- c. The team did make collection of natural enemies associated with this pest in the country, and two species were found to be partially active on the cochineal which can be a kind of help to control this pest.

Recommendation for Jordan: A field survey is required to screen the available natural enemies in the area where cactus cochineal is currently present.

It is advisable to communicate with the Mexican Ministry of Agriculture in order to import the natural cochineal predators.

“Israel did introduce two predators from Mexico, which have been multiplied and released for the control of the cochineal. But not much information on the degree of success has been reported.

3. Test and identify different biopesticides (medicinal plants that have insecticidal properties, and essential oils of local species) in addition to some detergents for their efficacy against the cochineal.

Recommendation for Jordan: Test some medicinal plants that have insecticidal properties to evaluate their effect on cochineal

4. Genetic Resistance: INRA and ICARDA have screened the national and international collections (248 accessions) in a hot spot area, in screen cages and also in the lab and greenhouse (3 replications in each) and identified 8 accessions that are highly resistant to the cochineal. These accessions have been registered in the Moroccan varietal catalogue and are now under multiplication in several platforms across the country using conventional methods. Efforts of using tissue culture technique for cactus multiplication is under development. The Genetic Resistance can be considered as one of the best and sustainable solutions for the management of this pest.

Recommendation for Jordan: there is a need to make a survey in the affected areas and see if there are accessions which are not damaged by the pest. These accessions and any other collection (ICARDA, NARC, etc.) need to be screened in a hot spot in the field, lab and greenhouse for resistance to the cochineal.

III. Raising Awareness

Training farmers and extension personnel: A lot of hands-on trainings were conducted in the affected provinces to train extension personnel and farmers how to manage the pest. Also, several brochures, spots on TV and radio have been developed and broadcasted.

Recommendation for Jordan: The Ministry of Agriculture needs to develop training materials to raise the awareness of the insect among farmers and extension staff.

Dr. Mustapha El-Bouhssini informed the participants about the Symposium event about Cochineal during the 13th Arab Congress of Plant Protection which will be held in Tunisia 1-6 November 2020, Hammamet. (this has been postponed for a year). In this event two contradictory issues will be tackled how to enhance the use the Cochineal as biological control for invasive cactus and how to control this insect as on the cactus plantation in other countries. The debate is not to recommend using the natural enemies to control the wild Cochineal insect as this will result in killing this insect which is needed in other countries. The suggested solution is to use the existing natural enemies and not to introduce new ones from other countries, in this case we are keeping the environmental balanced.

Dr. Hassan Machlab thanked Dr. Mustapha for his valuable inputs and requested Dr. Ahmad Katbeh (The University of Jordan) to brief the audience about the current situation of Cochineal in Jordan, does it need an urgent interfering until the biological control is discovered?

Dr. Ahmad Katbeh Bader stated that two years ago early in 2018, plant samples were brought from North of Kingdom close to Syrian borders, right after a field observations were conducted to examine the presence and the spread of the Cochineal scale insect in the north, middle and south Jordan. At that time the insect was recorded only in the north part of Jordan. We collected some of the insects hoping that the cochineal natural enemies which was introduced into Palestine reached the area, luckily, we found the Mexican natural enemy (*Hyperaspis trifurcate*) in north areas. A number of this insect were brought to the lab in order to be reared, unfortunately due to the lack of fund we had to stop.

A letter has been sent to the Ministry of Agriculture to inform them about this insect along with suggested control program proposed in a published paper. The cochineal insect is still active in north areas and now it is expanding. Field survey needs to be conducted to cover areas in the country, survey for natural enemies also is needed, from our experience some of the natural enemies is already existed in the country such as *Cryptolaemus montrouzieri*: beetle originally from Australia, found in Lebanon, also released in Palestine but spread in Jordan decades ago. This natural enemy can be one of the solutions even though it is not specialized on *Dactylopius opuntiae*. Looking for more natural enemies could be a good option. In addition to introduce natural enemies from the country of origin such as *Leucopis bellula* fly could be a valid option to control this insect. Dr. Ahmed mentioned that more than 50 species of Coccinellidae were recorded in south Syria which indicated that many Coccinellidae species may exist in Jordan mainly in Northern part which might be useful to control this insect.

Regarding chemical control more clarification is needed from our colleagues in the Ministry of Agriculture and the National Agricultural Research Center.

Dr. Ahmad suggested to form a committee in order to meet frequently and coordinate the implementation of the suggested action points in addition to exchange of information with other countries.

We might get advantages from the cochineal infection to plant for establishing cactus plantation following the best agronomic practices which allow to apply the required pest control in addition to maximize the production.

Dr. Ahmad declared that all the information and picture of wild cochineal insect are available, and he is ready to share it with NARC in order to develop extension materials very soon.

Engineer Asim, indicated that during the survey which was conducted with Dr. Ahmed, the National Agricultural Research Center staff were able to observe the existence of the larva of lepidoptera, also they were able to find the *Leucopis bellula* fly (this needs to be investigated to be confirmed), of course in addition to the Mexican natural enemy (*Hyperaspis trifurcate*).

He mentioned that for his knowledge *Cryptolaemus montrouzieri* is existed in Syria and Palestine but not sure if it is observed in Lebanon or Jordan.

He mentioned that there is another insect natural enemy already in Jordan which is *hyperaspis polita* although it is associated with this pest, it could be a good option since it was tried on other mealybugs and the results were very satisfactory. In addition to other species which belong to Coccinellidae that can be useful.



Dr. Abdul Wali Tahat expressed his happiness to participate in this event, he briefed the audience about the status of the pest in Irbid area. In fact, cactus plantation is scattered without much care, this is other reason behind the spread of this insect in the area. The insect started in Bani Kinana, then Al koura and the continuous expansion is ongoing. The control this insect by spraying the organophosphate insecticides and summer oils” Dr. Abdul Wali said

Dr. Mounir Louhaichi acknowledged Dr. Nizar for his initiative to hold this workshop also he appreciated all the valuable inputs from all participants. He suggested to get advantages from Moroccan experience as most of the work was done by the NARs and ICARDA, there was small financial support from FAO under Technical Cooperation Programme (TCP). Therefore, he recommended NARC to come up with concept note and apply for a TCP fund (FAO). This request will be most likely approved due to the importance of this issue. FAO now is planning to hold a regional workshop including many countries from the Middle east and North African region in order to come up with practical recommendations to overcome this serious issue.

Dr. Mounir mentioned that the cactus congress that was supposed to be held in Tunisia, is agreed to be held in Brazil in 2021 but due to Corona virus, it may actually going to be a virtual congress. He encouraged all participants to send their abstracts as there will be a special session on this topic.

To save time we need to raise awareness and it is very urgent to produce a flyer to clarify the danger of this insect and the recommendations for the farmers to control it. In addition to highlight the importance of informing the Ministry of agriculture in order to act directly.

Recommendation for Jordan: Apply for FAO TCP (can be a regional one including neighboring countries). Also to produce flyers/brochure as extension material about this insect to raise awareness among all stakeholders

Dr. Ahmad Sharaida mentioned different scenarios about the insect journey in the region and how it reached Jordan.

Engineer Ibrahim Bashabsha raised his concerns about the spreading the infection by the peddlers therefore the awareness is very much important.

Engineer Asim pointed that if we are sure about the natural enemies and to save time why don't we start collecting and rearing these natural enemies this work can be done with collaboration between the University of Jordan and NARC.

Dr. Nizar Haddad mentioned that the cochineal issue was raised during the international training workshop held by ICARDA in July 2019 in Jordan encompassing participants from ten different countries. One of the recommendations out of this international workshop was to get rid and burn the infected cactus old plantation, after two years NARC with ICARDA will provide improved accessions materials from the international nursery established in Muchaqqer. Over 350 farmers received the cutting of cactus accessions.

He mentioned that depending on the reports, luckily, the insect is still around Irbid area only and didn't spread over to the middle areas or south of the country. He stated that NARC is in the process of producing a short video about this insect. He highlighted the importance of registered some pesticide by the plant protection directorate in order to recommend it.



Dr. Sawsan mentioned that in addition to the mechanical methods the insect is also spread by wind which is very dangerous and required very quick actions to prevent the spread of this insect or at least slow it down until valid control option is available.

Concluding remarks

Dr. Nizar Haddad appreciated the inputs of all participants and speakers for all the important inputs. He concluded that this workshop is the first step toward in our road map to control this pest. The first action would be to formulate a committee to follow with all the action points. The committee consists of Dr. Sawsan Hassan from ICARDA, Dr. Ahmad Katbeh Bader from University of Jordan, Engineer Jihad Haddadin to nominate a person from NARC, one person from GIS department will be nominated by Dr. Nizar, one person from Ramtha research center; Dr. Abdul Wali and one person from Irbid agricultural directorate should be in this committee. This committee will develop a road map following the recommendations of this workshop. At the end Dr. Nizar appreciated the prompt response from ICARDA to hold this workshop. He said that this is event will be as the start of an execution plan.

Dr. Hassan Machlab appreciate the involvements of all parties in this workshop. Concept note for raising fund is very important.

Dr. Mounir Louhaichi thanked everyone and expressed his satisfaction with all the agreed recommendations (action points). He also highlighted the huge efforts deployed in Jordan over the last few years to establish one of the best cactus germplasm perhaps in the world. If these recommendations are successfully implemented, the results to eradicate this pest would be great.

Dr. Mustapha El-Bouhssini thanked all the audience and express his willingness to be part of any future activities.

Dr. Sawsan Hassan: Appreciated all the inputs and started to share the minutes of this workshop with everyone.

Action Points:

Dr. Mustapha El-Bouhssini: to share the following with Dr. Hassan Machlab and Sawsan
The Concept Note developed for regional project

Dr. Sawsan Hassan:

To share all the resources provided by Dr. El-Bouhssini

To Share the minute of this meeting

To follow up with suggested committee members to implement all the recommendation of this workshop

Dr. Ahmad Katbeh Bader:

To share the Materials with NARC and ICARDA to develop extension flyer

National Center for Agriculture Research

To follow up on the video will be produce on the risk of this insect

To provide the names of the people will be nominated to be part of the committee

To work with ICARDA and University of Jordan to apply for fund raising.



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