

Article

Boufaroua (date palm mite) control constraints in Ziban date palms (Biskra, Algeria)

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Abstract: Date production is of strategic economic importance to Algeria but faces several challenges, especially from pests and diseases. The date palm mite, (*Oligonychus afrasiaticus*), commonly known as Boufaroua, ranks among the major pests in Algeria. It reproduces rapidly and causes significant losses. Numerous constraints hinder the control of Boufaroua which, consequently, have a direct economic impact on date production. This study reports on a survey of date growers and institutions acting in the control of this pest to identify the various constraints and subsequent impact on the date sector in Biskra. Pest control training programs, orchard sanitation awareness, detecting and management of first sources of infestation are recommended. The current study also, draws attention to the importance of engaging grower associations and other stakeholders to oversee the campaign, ensure effective monitoring of private operators (POs) and certify implementation of agreed pest management procedures or protocols.

Keywords: Date palm; Boufaroua; Constraint; Economic impact; Sustainability.

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1. Introduction

The date sector in Algeria occupies a strategic position in the national and especially the Saharan agro-economy (sedentarisation of populations, development of arid areas, jobs opportunity, subsistence and income provision, foreign currency reserves (export) and plant genetic richness). Currently, there is a coexistence of two systems: traditional oasis system, which is the major one, and an expanding modern plantation [1]. Algeria has almost 20 million palm trees over an area of 170,000 ha in several departments in the south of the country. Along with the development of date production, the manufacturing industry in this sector has become an integral part, with more than 30 by-products (food and paramedical products, animal feed, etc.), which are also local products with promising export prospects [2].

Plant pests and diseases are the most serious threat. They often have a visible economic impact and mostly affect marginalised communities. Among the pests that threaten this sector is the date palm mite (*Oligonychus afrasiaticus* McGregor), more commonly known as Boufaroua.

Boufaroua was described and reported in Algeria by André [3], where in 1927 it caused serious damage in Biskra, Sidi Okba, Aïn Naga and Zeribet El Oued. The damage caused by this mite can be considerable, depending on the year and the region. Losses can affect the entire date production. For instance in 1981, damages reached 70% [4]. This

mite has increasingly become a significant threat, especially in recent years due to the cumulative effect of drought in the various palm groves [5].

Crop loss caused by Boufaroua can be seen as such a threat to food security in Algerian arid areas. Chemical control of Boufaroua is often carried out by the National Institute of Plant Protection (INPV), private operators (POs) and date growers.

However, many constraints hinder the control of Boufaroua and consequently have a direct economic impact on date production.

In the present study, we conducted a survey with date growers and engineers from institutions involved in the control of this pest. This is to identify the various constraints associated with the control of Boufaroua and to highlight their impact on the development of the date sector in the Ziban basin.

2. Materials and Methods

The fieldwork was carried out from 2021 to 2022 using a combination of two complementary methodological approaches: a questionnaire survey with 165 date growers in Biskra (Figure 1) and a series of interviews with officials from the region's agricultural institutions. The results of the survey were used to identify Boufaroua control constraints. The combination of these two tools helped to broaden the identification of constraints beyond simple technical difficulties.

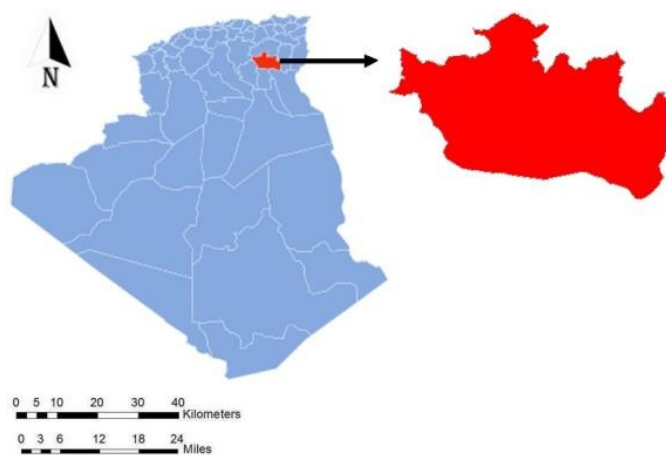


Figure 1. Map of the study area.

3. Results

Boufaroua attack can damage the entire crop and its infestation rate was evaluated. It ranges from 0 to 100%.

In traditional exploitations, which represented more than 71% in the study, Boufaroua infestation rate often exceeds 60%. A number of constraints have been identified, which contribute to increasing damage caused by this mite. Indeed, more than 3% of growers do not practice grove sanitation (weed control in particular). Poor maintenance of the drainage network (drains overgrown with reeds) accentuates Boufaroua infestation where 84.4% of farms use gravity irrigation. In modern exploitations, closed farms and the absence of owners lead to an access problem to groves which forces POs to spray around.

Furthermore, intercropping system not only hinders the passage of treatment units, but also provides breeding sites for the mite, knowing that 58.6% of farmers plant up to 8 fruit species in their exploitations. Among interviewed date growers, 47% use only chemical treatments. Nevertheless, 25% of farmers say that the treatment was ineffective and 89% declared that they did not receive training regarding acaricides use. One third of farmers (38%) did not use any treatment against Boufaroua. Moreover, the use of traditional pest control is not widespread among date growers (only 6% use it). 14% of farmers often struggle to gain access to equipment and machinery to control Boufaroua.

4. Discussion

Often, pests damage cause reduction of crop quality or quantity and increasing pest control charges at a grower level. At the state level, it would lead to food insecurity and economic disturbance. An INPV's report stated that fourteen (14) departments were concerned by treatment against Boufaroua, more than half of date-growing departments (54%) [6]. Infestation rate recorded by this service, in 2021, has varied from 1 to 11% in Biskra. Moreover, crop loss estimation due to pests usually depends on a number of factors related to environmental conditions, the plant species being cultivated, socio-economic conditions and the economic situation [7].

Weeds can be a reservoir host for pathogens and arthropods and lack of weed control in date palm groves creates a favourable environment for the development of Boufaroua. Besides, treatment units will find it difficult to gain access to the groves to carry out phytosanitary treatments which increase the risk of spreading to neighbouring groves. Indeed, Boufaroua infests other plant families, particularly grasses [8,9]. Guessoum [10] listed two fruit species, *Vitis vinefera* L. (Vitaceae) and *Ficus carica* L. (Moraceae) which are secondary hosts of Boufaroua

A thematic report on the "environmental impact of pesticides" in 2022, produced as part of the support program for Algeria's agricultural sector (PASA), stated that date growers treat Boufaroua very sparingly, and only chemical treatment was widespread. The number of commercial formulas is also limited [11].

This ineffectiveness of chemical treatment proclaimed by farmers is probably due to several factors:

1. Delay in farmers list transfer which benefiting from acaricides;
2. Lack of training of date growers regarding acaricides use;
3. Insufficient phytosanitary treatment equipments.

Statistics for 2022 revealed that 4,161,555 palm trees were treated (22.6% by INPV, 34.4% by the POs), but other factors contribute to the vulnerability of date palm groves to Boufaroua such as [6]:

1. Weak distribution of treatment sites for the INPV and POs teams;
2. Lack of coordination among different stakeholders;
3. Difficult control and supervision of POs;
4. Location of areas to be treated by the POs is difficult;
5. Delay in phytosanitary treatments and obsolescence of vehicle fleet;
6. Negligence of first sources of infestation.

Some farmers still use traditional methods to control Boufaroua [12] by:

1. Setting fires using weeds and date palm waste;
2. Sulfur mixture with agricultural lime (1:2);
3. Washing the attacked bunches with water;
4. Cutting off the infested branches or date bunches;
5. Using ash powder, some growers add lime to the ashes;

Identified constraints contribute to the loss of production due to Boufaroua attacks. They are mainly related to:

1. Lack of training and knowledge for date producers and POs in terms of mites' control;
2. Control campaigns are not well organised;
3. Lack of early warning system based on artificial intelligence;
4. Insufficient and inadequate equipment for phytosanitary control;
5. Lack of information on the start of control campaigns among farmers (Figure 2).

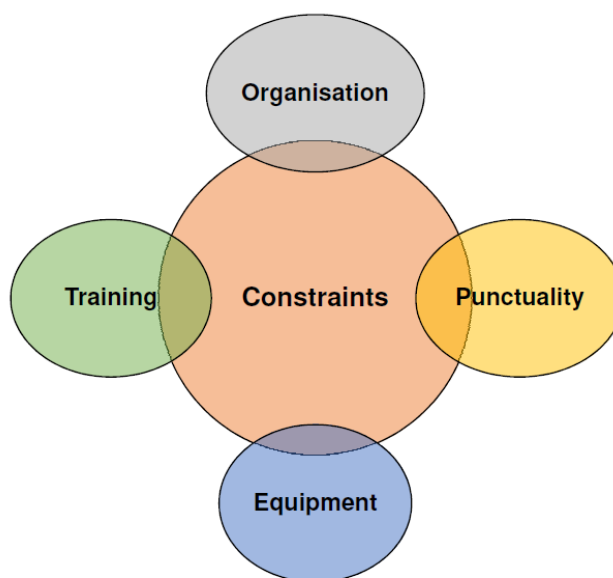


Figure 2. Diagram of Boufaroua control constraints.

5. Conclusions

Identified constraints linked to Boufaroua control might have an impact on the development of the date palm sector causing drop of productivity and shortage in dates supply which could lead to an increase in date's price. Indeed, date production loss not only affects the availability of dates, but also cause financial difficulties for date growers which are unable to produce dates to their full potential. Consequently, their incomes will fall and overall date production declines. Lower productivity can have a knock-on effect on employment, rural development and food security. Tackling the economic impact of these constraints for Boufaroua control needs engaging grower associations and other stakeholders to oversee the campaign, strengthening farmers' organisation, ensuring effective monitoring of POs, and certifying implementation of agreed integrated pest management procedures or protocols. Therefore, all these steps are essential to the sustainability of date farming and the national economy. Additional studies to understand more completely the key tenets of the impact of date palm mite (Boufaroua) control constraints on the development of the date palm sector are required.

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