

# WILLOW SHORT ROTATION COPPICE – LOCAL NATURAL POPULATIONS *VERSUS* SELECTED COMMERCIAL CLONES IN VARIOUS SITE CONDITIONS IN WESTERN ROMANIA

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## INTRODUCTION

The use of woody biomass as a renewable raw material with high caloric value and low production costs is an economically efficient and environmentally friendly way to get energy with insignificant environmental impact (Borlea et al. 2003). Lignocellulosic biomass has the potential to become a key element in the renewable energy production especially through energy plantations (fig.1). Its universal availability in large quantities and its low and limited use at present are reasons which make it one of the most promising resources in the future. The ever- increasing requirements for biomass, both in terms of quantity and quality require the existence of intensive plantations with high biomass production, resistance to pests and diseases and good adaptability to various local conditions. *Salix* sp. could be easily planted in areas with water in excess and the wood is used for industrial purposes (Ivănescu & Nicovescu-1979, Șofletea & Curtu-2007). The expansion of energetic willow plantations in Western Romania has triggered different pests species in the region, known or unknown as willow crop specific pests. Significant damage brought by these pests have sparked interest of *energetic willow* farmers. Only in Timis county, wire worm larvae attacked the willow cuttings and destroyed 25 hectares of plantation recently. The pests and diseases genetic potential of local provenances of *Salix*. sp. could be of great interest in this respect. Regarding the resistance to pests and diseases, the local provenances of native or exotic *Salix* sp. have not been included yet in comparative experiments with energy willows recently introduced in our country. Observations and analysis were performed in the studied experimental plots regarding the identification of pests and diseases. Preliminary researches were initiated and are presented in this paper.

The **scope** of the research is to identify which of the variants analyzed (Swedish commercial clones of willow and local provenances of willow species) get the best results in terms of resistance to diseases and pests and which is the best adapted in the specific soil and climatic conditions of Western Romania

## MATERIAL AND METHOD

There were two experimental plots with different local conditions but typical for the Western part of Romania: plain region with moderately salty soil and hilly region with alluvial soil. In order to achieve the research objectives, observations were made regarding the most important pests and diseases using the existing descriptions and information (Chizdavu-1997, Marcu-2005, Ianoș-2008, Selegean-2011). The resistance/sensitivity to the parasites attack was estimated at the age of one (2012) and three (2014) at individuals originating from cuttings with definite origin. To highlight the general pest resistance potential of different variants, intensity of defoliators and mite attack were studied using recognized methods (% of the total affected area of leaves/ % of the total leaves area) and the results were statistically processed. In order to measure the intensity of the attack, 3 experimental surfaces of 100 m2 were randomly installed in the affected area. About 30% of the total area was affected by the pest attack. The product used in pest control was Fastac 10 EC, used at 0.8 l/ha in 300 l of solution. Two weeks after this treatment, on the same surface it was applied also a systemic insecticide – Novadim Progress at 1 l/ha in 300 l of solution (Trava et al.-2014).

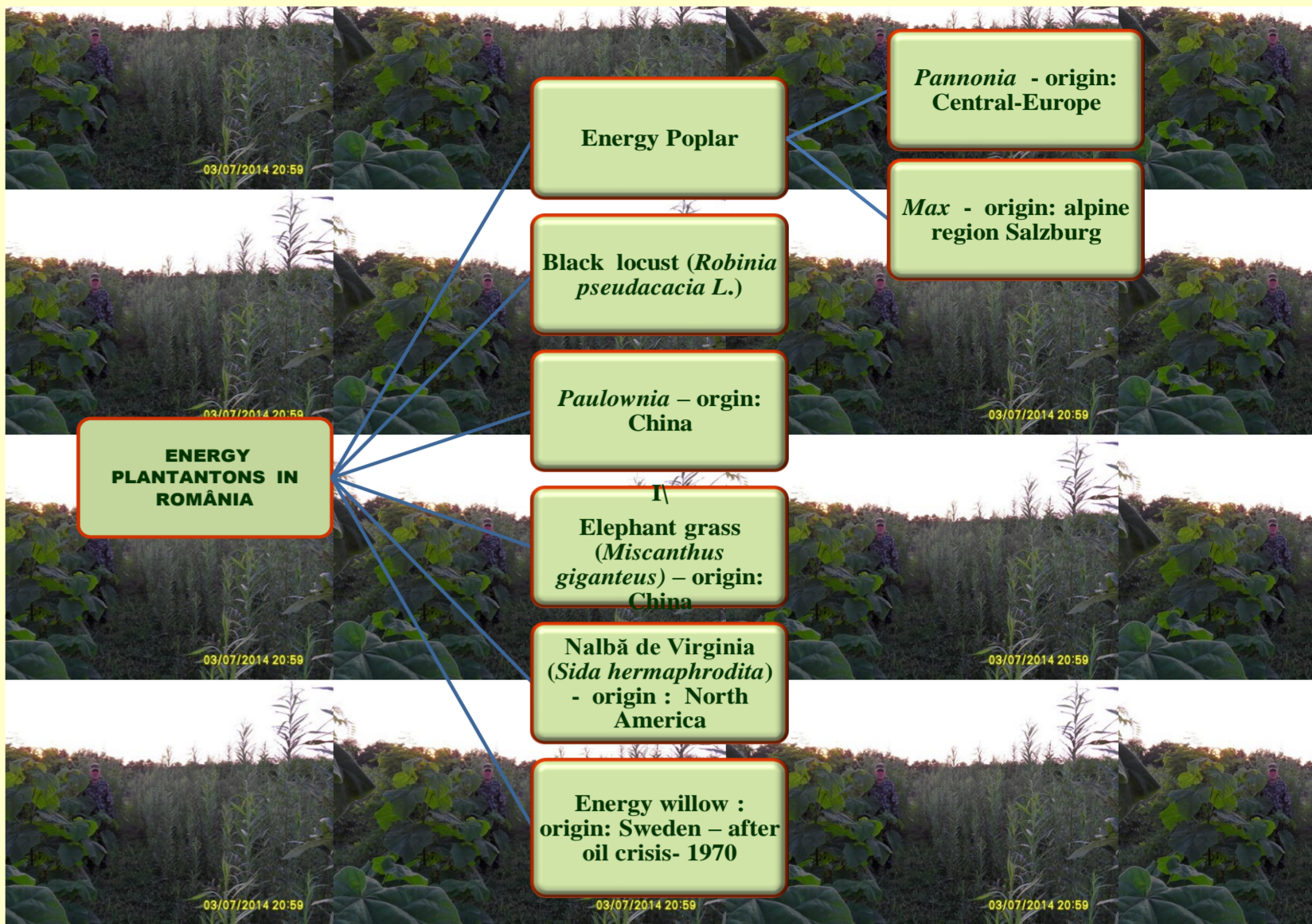


Fig. 1 ENERGY PLANTATIONS IN ROMANIA

## RESULTS

The main pests and diseases observed in Western Romania *Salix* sp. plantations are presented below.



a. *Agriostes* sp



b. Attack of *Agriostes* sp.



c. Unaffected *Salix* sp. plantation



d. Affected *Salix* sp. plantation

Foto. 1 THE WIRE-WORMS (*AGRIOSTES* SP.) ATTACK IN *SALIX* SP. PLANTATION GHILAD-WESTERN ROMANIA (ORIGINAL)



FOTO 2 . MITES ATTACK IN *SALIX* SP. PLANTATION GHILAD-WESTERN ROMANIA (ORIGINAL)



FOTO3. *DORCADION AETHIOPS* (*CARINATODORCADION AETHIOPS*) ATTACK IN *SALIX* SP. PLANTATION GHILAD-WESTERN ROMANIA (ORIGINAL)



FOTO 4. *VENTURIA SALICIPERDA* IN *SALIX* SP. PLANTATION GHILAD-WESTERN ROMANIA (ORIGINAL)



FOTO 5. *FUSCLADIUM SALICIPERDUM* IN *SALIX* SP. PLANTATION GHILAD-WESTERN ROMANIA (ORIGINAL)



FOTO 6. *MELAMPSORA SALICINA* LEV- IN *SALIX* SP. PLANTATION GHILAD-WESTERN ROMANIA (ORIGINAL)

The most important recent attack in *Salix*. sp. plantations of Western Romania was performed by defoliators (species of *Lepidoptera- Limantriidae* and *Arctiidae*) and mites. The analysis of the average intensity of defoliators attack (% attacked from the total leaves surface) show a higher sensitivity of the studied commercial Swedish clones : *Inger*= 20%, *Sven* = 16% , *Klara* =15%, *Olof* = 15%, *Stina* = 14,2%, *Tora*=10%, *Tordis* = 10%, than the local provenances of *Salix tortuosa* (7%), *Salix alba* (6%) and *Salix fragilis* (5%) (Fig.2). The analysis of the average intensity of mites attack show that from the commercial Swedish clones, *Gudrun* is the most sensitive (40%) and *Tora* (6,6%) the most resistant. The local provenances of the analyzed *Salix* sp. show **total resistance** at the mites attack (Fig.3).

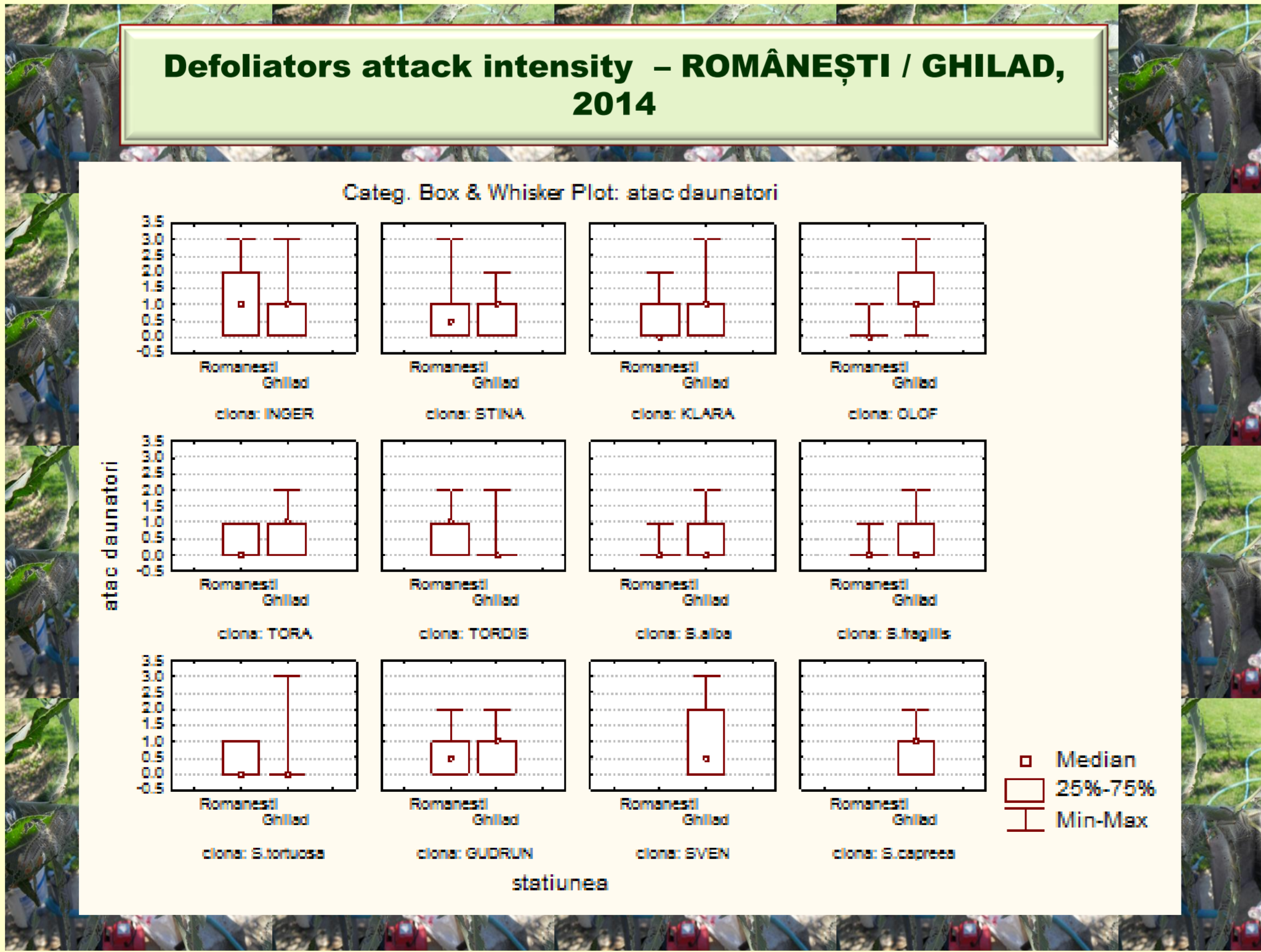


FIG. 2 DEFOLIATORS ATTACK INTENSITY, ROMĂNEȘTI/GHILAD 2014

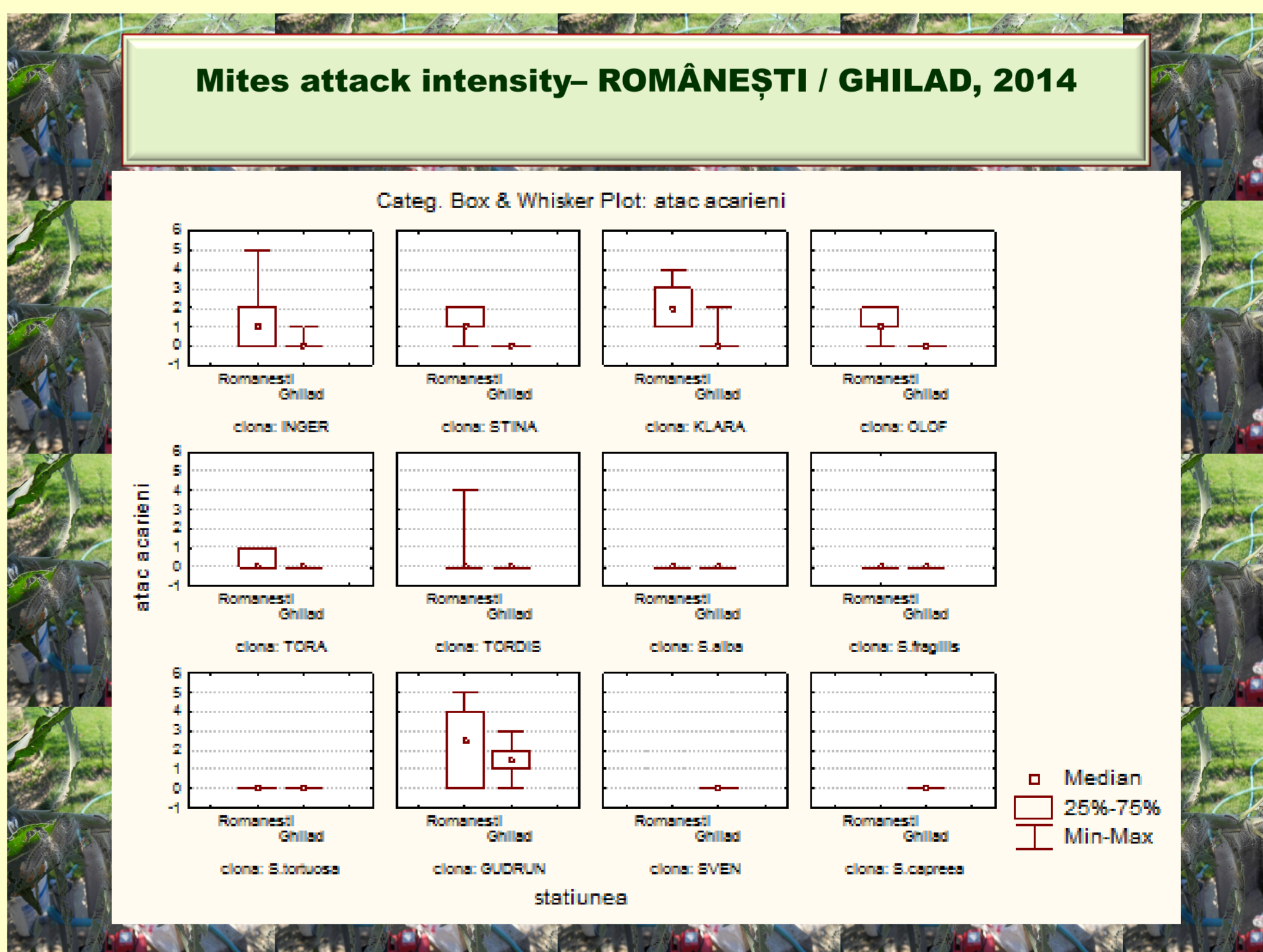


FIG. 3 MITES ATTACK INTENSITY, ROMĂNEȘTI/GHILAD 2014

## CONCLUSIONS AND RECOMMENDATIONS

The local provenances of the analyzed *Salix* sp. show better results regarding the adaptability and the resistance to the parasites attack that from the commercial Swedish clones.

The present research (2012-2014), has revealed 2 new important parasites for *Salix* sp: the wire-worms (*Agriostes* sp.) and *Dorcadion* sp. in the experimental area Ghilad.

An original contribution of the present research is the identification of the possibility of using the local provenances of *Salix tortuosa* and *Salix fragilis* in energy willow plantations with acceptable biomass production and with a specific advantage of better adaptability to drought and better resistance to parasites (defoliators and mites).

In order to obtain high productions in energy *Salix* sp. plantations in Western Romania the clones: *Stina*, *Tora* și *Olof*, should be used with priority on fertile soils.

For average production in energy *Salix* sp. plantations with high resistance to pests and diseases attack in Western Romania, the local provenances of *Salix tortuosa* and *Salix fragilis* could be used in local conditions.

The phytosanitary treatments heavily diminish the productive potential of *Salix*. sp. energy plantations and must be preventive.

The potential extension of the energy willow plantations should be better studied in the near future by including in future experiments more local provenances of native or exotic *Salix* sp. with good resistance to pest and diseases, as the existing commercial willow clones with outstanding results regarding the biomass production could present adaptability difficulties and low resistance to the local pests and diseases attack

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