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Ecological study for groups of citrus weeds in the Skikda region, Algeria

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ABSTRACT

The study of citrus weeds in the Skikda region during the 2017/2018 crop year included 40 phytoecological surveys of different crops. They were distributed throughout the study area in order to take into account the variability of ecological and Agronomic factors. The results obtained by the Correspondence Factor Analysis (CFA) highlight two groups of surveys including two groups of species. These results explain the distribution of citrus weeds in the Skikda region according to climate and edaphic conditions. The appearance of weed species was selective, for example, *Oxalis Latifolia*. Kunt. is a very common and abundant species in the more or less humid northern zone, whereas it is almost absent in the southern zone of the study area. On the other hand, *Papaver rhoeas*. was frequent and abundant in the southern zone, which is a somewhat dry zone, was almost absent in the northern zone.

Introduction

The raison d'être of agriculture is that in a cultivated field any plant that is not sown or planted voluntarily is considered undesirable and the farmer does not stop destroying these weeds which it is easy to show the nuisance as they sometimes penalize returns (Jauzein, 2001). Weeds cause since always trouble farm producers. Heavy losses in yields and quality harvests result from weed competition (Buhler, 1997). Crop weeds are responsible for 5 per cent of harvest losses in temperate zones and generally more than 25 per cent in tropical zones (Le Bourgeois, 1993). The weeds have always been an important nuisance for tropical agriculture. The heat and abundance of the rains during the growing season indeed favor the development of these weeds. In fact, the evolution of the flora has been observed over the years. Cultivation immediately after clearing there

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are few troublesome weeds at least in annual cultivation (Le Bourgeois and Marnotte, 2002). The objective of this work was the study of the ecology of groups of citrus weeds in the Skikda region (Algeria). The phytoecological survey technique used is that of the orchard tower, which makes it possible to know the different species of the plot and to take into account the variability of ecological and agronomic conditions.

Materials and Methods

Sampling method

The characterization study of citrus weeds in the Skikda region during the 2017/2018 crop year covered 40 phytoecological surveys conducted in different citrus orchards. They were distributed throughout the study area to take into account the variability of ecological and agronomic factors (Lebreton and Bourgeous, 2005). The surface observation is often linked to the notion of minimal area. In the cultivated environment, several authors (Barralis, 1976; Maillet, 1981) consider, in the case of citrus growing, that apart from discontinuities of an edaphic order, a plot or a not too large size represents a relatively homogeneous unit when to environmental factors, particularly agronomic ones, that can influence the development of species. The surveys were conducted during the period March - May.

Phytoecological record

The observations were made according to the phytoecological study protocol for the analysis of grass cover of citrus orchards. The survey technique used is that of the turn of the lid, which allows to know the different species of the plot (Lebreton and Bourgeous, 2005).

Study of the ecology of groups of weeds

The objective of this part is to characterize the flora of citrus orchards, to know and to understand how this flora develop and is distributed under the influence of natural and environment factors. Such knowledge, which aims to contribute to the development of sustainable and integrated management of citrus weed flora, involves not only the qualitative and quantitative analysis of weeds, but also the study of ecology species and in particular the relationship between weeds and the environment in order to understand the most discriminating environmental descriptors on species distribution (Loudyi et al. 1995).

Data analysis

For data entry and interpretation, species are coded according to BAYER's 5-letter international mnemonic indicator (Le Bourgeois, 1993). The variables are coded with two letters followed by the corresponding modality. The data management, corresponding to the sets 40 records, 86 species was made on a computer using the software Statistica '08' (Statistica, 2007).

Ecological study

We used a method often used simultaneously (Le Bourgeois, 1993; Maillet, 1981) for the analysis of ecological data, a global approach based on correspondence factor analysis (CFA). The CFA gives the possibility of summarizing in a few important dimensions the greatest variability of the data matrix. We can then present variables and individuals in the same dispersal space (Le Bourgeois, 1993.) and know the amount of information explained by these few independent factorial axes (Legendre and Legendre, 1984). The maximum covariance between the descriptors is thus accounted for and the essential relationships between the vegetation and the environment are identified.

Results and Discussion

Analysis of the species-survey matrix (results achieved by CFA)

The cumulative percentage of inertia absorbed by the first four axes is 46.94. It is respectively 14.43, 12.00, 10.87 and 9.64. The increase of these values indicates a strong heterogeneity of the floristic lists.

Space surveys-species

The correspondences relating to the factorial maps of the spaces surveyed-species allows us to even on which floristsbase rests the groupings of the statements highlighted. species maps provide visualization of existing affinities between survey groups and species groups. The analysis of the maps relating to the axes 1-2 (Figure 1), 2-3 (Figure 2) and 2-4 (Figure 3) made it possible to distinguish two groups. However, we note that the latter have all changed their position and highlights the following correspondences: Group 1 corresponds to the group of species and surveys 1. Group 2 corresponds to the group of species and surveys 2.

The map established with the axes 1-3 (Appendix A) clearly highlights the separation of the groups 1 and 2, but the two groups has changed position, or the group 1 is dispersed on the negative side and the group 2 dispersed on the positive side of axis 3.

Meaning of factorial axes

The comparative study of the ecological significance of the axes is based on the global contribution of each variable to the axis and the ordinate of each modality of the variable on the axis (Fenni, 2003). Factorial axes 1 and 2 contain most of the information relative to the distribution of weeds in the ecological factors of the studied orchards (Traore and Mangara, 2009).

Axis 1 expresses the following gradients: The date of the survey because the readings made during the period March which are distributed along the axis 1 of the positive side, are opposed to the statements made during the period April and May lie on the other side of the axis. This is due to the opposition of winter-germinating species to spring-germinating species.

An agronomic gradient where the surveys carried out on orchards in the northern region are opposed to the surveys carried out on orchards in the southern region on the positive side. A geomorphological gradient where the surveys carried out on the plain orchards where the slope is zero on the negative side, are opposed to the surveys made on the orchards of hills and peppers on the positive side.

Axis 2 expresses the following gradients: A water gradient because the surveys carried out on the dry orchards on the positive side, are opposed to the surveys made on the wet orchards on the negative side.

A climatic gradient because the surveys carried out insheltered or sheltered orchards on the positive side, are opposed to the surveys carried out on the orchards exposed to all the winds on the negative side.

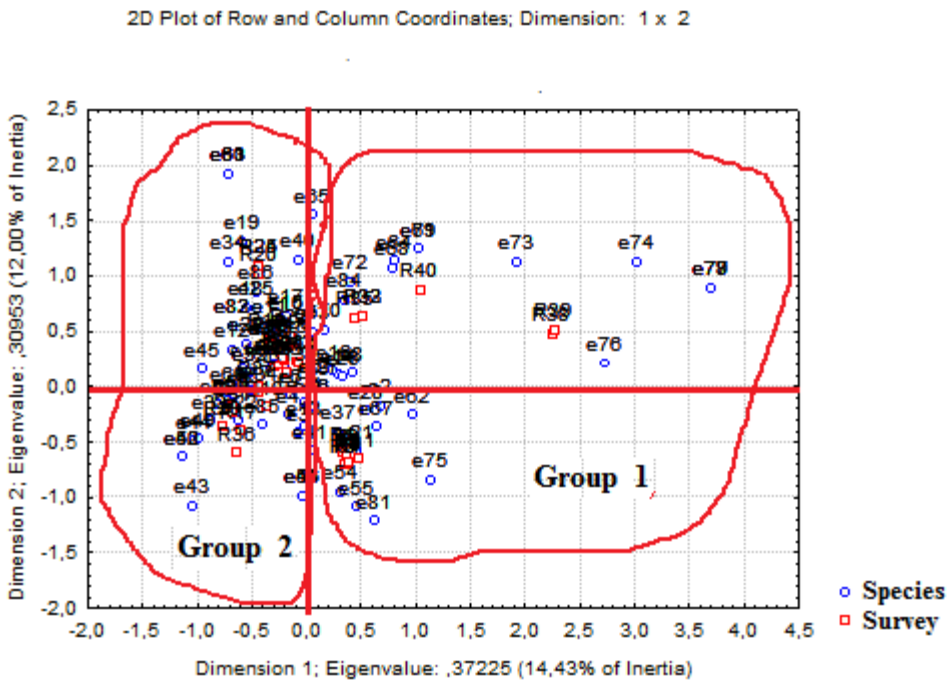

Figure 1. Delineation of species-survey groups on axe 1 (horizontal) and 2 (vertical), (CFA species-surveys).

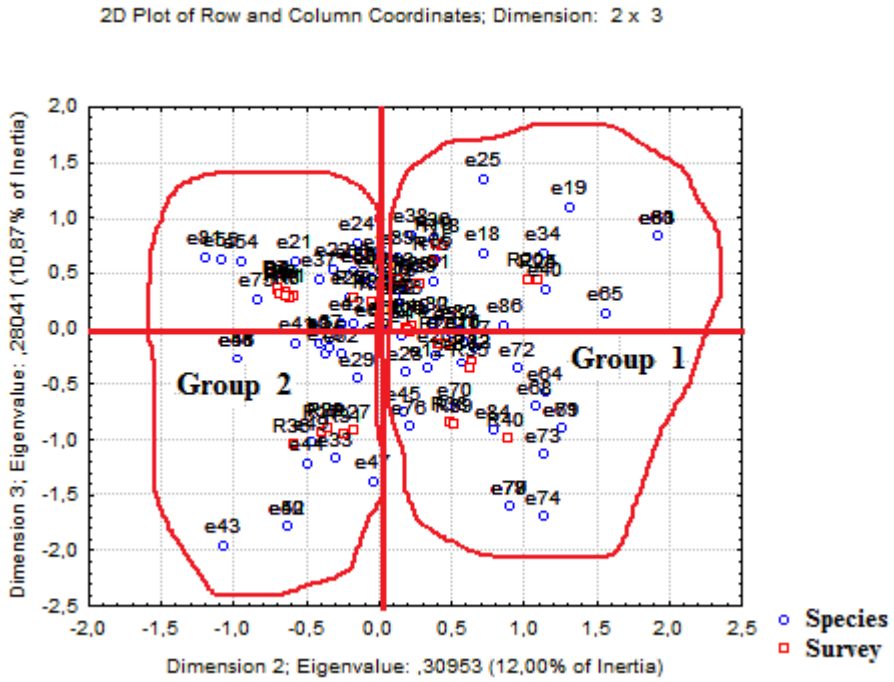

Figure2. Delineation of species-survey groups on axe 2 (horizontal) and 3 (vertical), (CFA species-surveys).

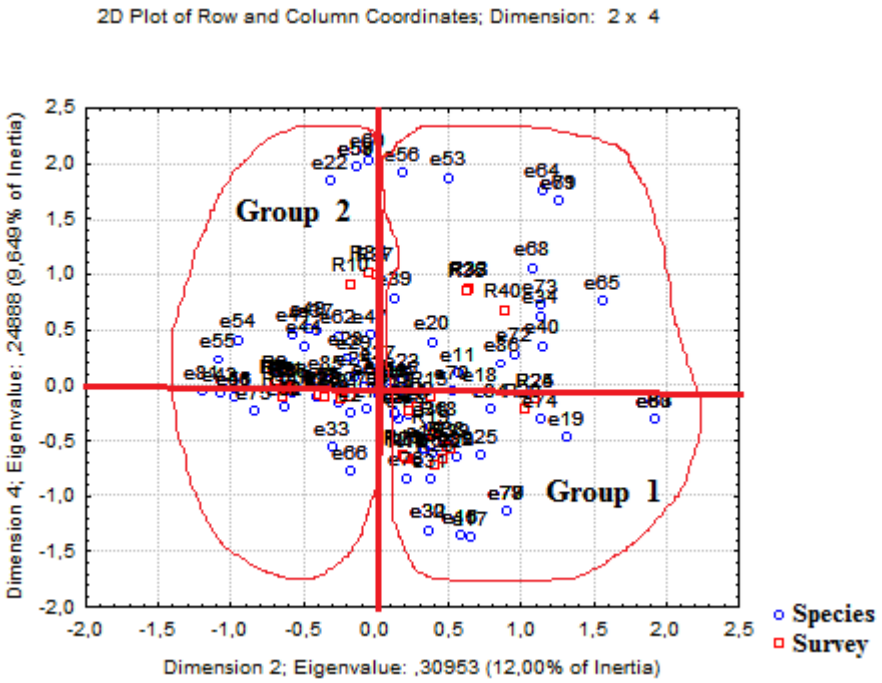

Figure 3. Delineation of species-survey groups on axe 2 (horizontal) and 4 (vertical), (CFA species-surveys).

Ecological conditions of groups of weeds

If we analyze the flora of a cultivated plot, we notice the great diversity of groups of weeds (Aymonin, 1965; Jauzein, 2001). The analysis of the factorial maps relating to the species-survey, made it possible to specify the ecological conditions participate in the composition of the groups of citrus weeds of the region of Skikda.

Group 1

This group of species comes from a Group 1 survey. This group contains several species grouped according to agronomic, hydrological, climatic and geomorphological conditions.

The group of species found in the zero-slope north zone essentially consists of: *Oxalis Latifolia*.kunt., *Bromus Tectorium*., Coleostephus Myconis L., *Coronilla Scorpioide*., *Chinopodium Ficifolium* JE, *Silene Gallicalo*., *Aegilops Geniculata*., *Geranium Columbinum* L., *Cirisum Arvense* L., *Festuca Arunadinacea*., *Torilis Nodosa*., *Chinopodium Glaucum* L.

Group 2

This group contains The species encountered on the mountainous area and hills, where arboriculture dominates are consiste of:

Chrysosplenium Segetum., *Cheopodium Mural*., *Gladiolus Italicu*.s, *Vicia Peregrina* L., *Vicia Bithynica* (L), *Papaver Rhoeas*., *Medicago Arabica* L., *Coleostephus Myconis* L., *Bourago Officinale* L., *Verbena Officinalis*, and *Knantia Arvensis*.

Although some species are not ecologically efficient for all the plots studied, they constitute an important agronomic constraint, with a high potential for harm, and represent a particular constraint (Lebreton and Bourgeous, 2005). Weed ecology is the most effective parameter for assessing crop infestation by weeds (Barralis, 1976). For farmers, the main weeds are those in the fields where they are found to have a high abundance, even though few fields are infested. To identify the main weeds, priority is given to the ecology of a given species in its study area, while considering its abundance (Soufi, 1988.). The relationship between the ecological data of the weeds gives an idea of the potential risk of the species.

Conclusion

The analysis of the factorial maps relating to the species-survey, made it possible to release some ecological information environmental factors and ecological conditions involved in grouping and distribution of groups of citrus weeds in the Skikda region (Algeria). The appearance of weed species is selective, for example: *Oxalis Latifolia*. Kunt. is a very common and abundant species in the more or less humid northern zone, whereas it is almost absent in the southern zone of the study area. On the other hand, *Papaver Rhoeas*. frequent and abundant in the southern zone, which is a somewhat dry zone, is almost absent in the northern zone.

Conflict of Interest

Authors declare no conflict of interest.

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