



Weed Infestation Patterns and Problem Species in Sunflower Crops: A Case Study from NARDI Fundulea

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INTRODUCTION

In general, the areas cultivated with sunflower show a strong degree of infestation (over 80%) with annual and perennial monocotyledonous and dicotyledonous weeds, extremely differentiated according to the zonal pedoclimatic conditions. In the field, the main objective is to permanently eliminate weed competition below the damage threshold throughout the growing season, in order to reduce water and nutrient consumption by them, so that plants continue to grow culture to have a normal development, which will lead, in the end, to obtaining high yields, qualitative and at the level of the biological potential of the hybrids (Popescu, 2007). The segetal flora is very diverse and numerous, through the numerical ratio of weed species present and especially the numerous combinations between the various biological groups. This variety is explained by the diversity of pedoclimatic conditions existing in the areas where this crop plant is cultivated (Anghel et al., 1972)

The number and spectrum of weeds are elements dependent on the type of soil, technological links (crop rotation, soil cultivation, sowing time, plant density, type and level of fertilization), etc. (Hanzlik and Gerowitt, 2011; Partal et al., 2023). Weeds have the greatest negative impact, around 37%, compared to insects (18%), fungi and bacteria (16%) and viruses (2%) (Oerke, 2006).

MATERIAL AND METHOD

Integrated weed management is a system of integrated measures to maintain the level of weed infestation of crops below the damage threshold with negative impact on the environment. Currently, weed management in European agriculture is subject to divergent trends generated, on the one hand, by access to innovative technological proposals (but sometimes insufficiently tested and adapted to specific local conditions) and on the other hand by the negative impact of climate change already observable and legislative restrictions requiring a reduction in the amount of herbicides. The research focused on determining the weeds, identifying and predominance of existing weed species in untreated variants located on the cambic chernozem soil type (3.2% OM; 37 clay, Ph 6.5) in the experimental field - Agrotechnics laboratory at NARDI- FUNDULEA. The main objective of the work was to study the weed species and identify the "problem" weeds (*Setaria viridis*, *Echinochloa crus - galli*, *Sorghum halepense*, *Xanthium strumarium*, *Ambrosia.sp.*, *Cirsium arvense*) present because each year, agricultural production losses are significant and expenses are high. During the period 2020-2023, the climatic conditions (precipitation and temperatures) recorded at Fundulea were very different from one to another. (Fig1 and Fig 2)

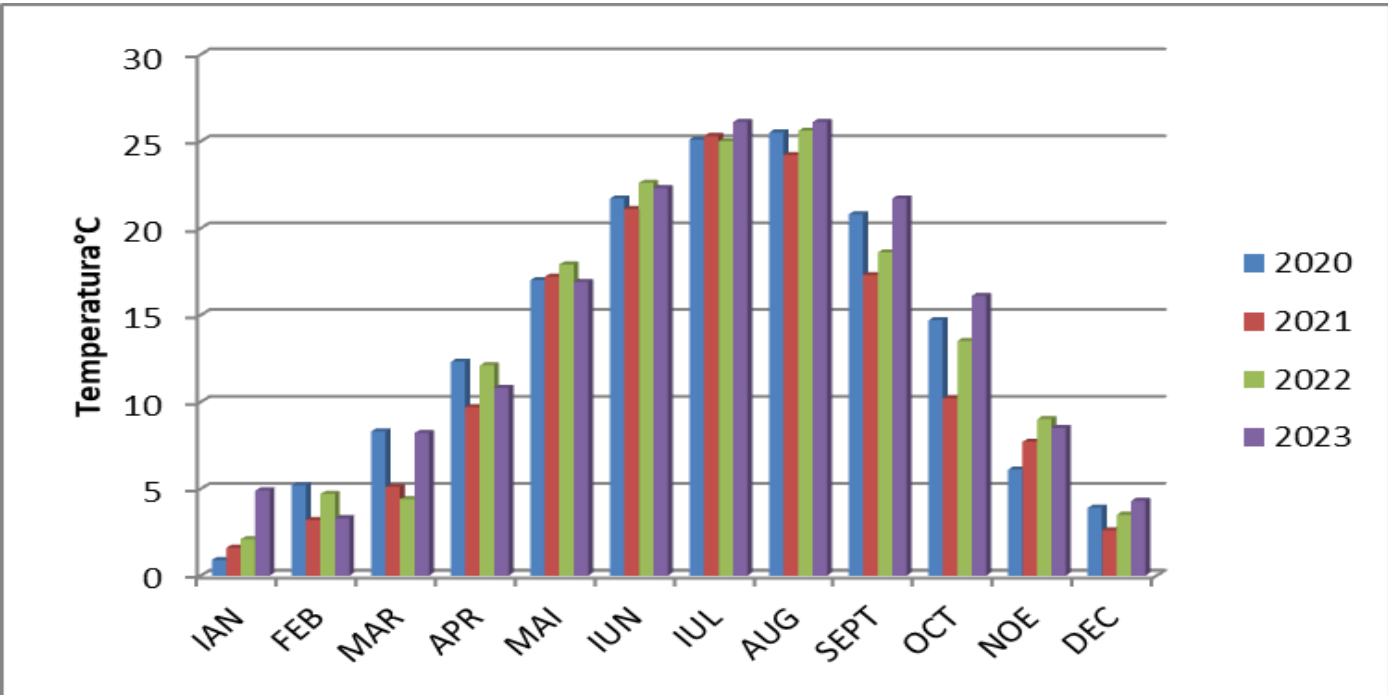


Figure 1. The precipitations from NARDI Fundulea 2020-2024

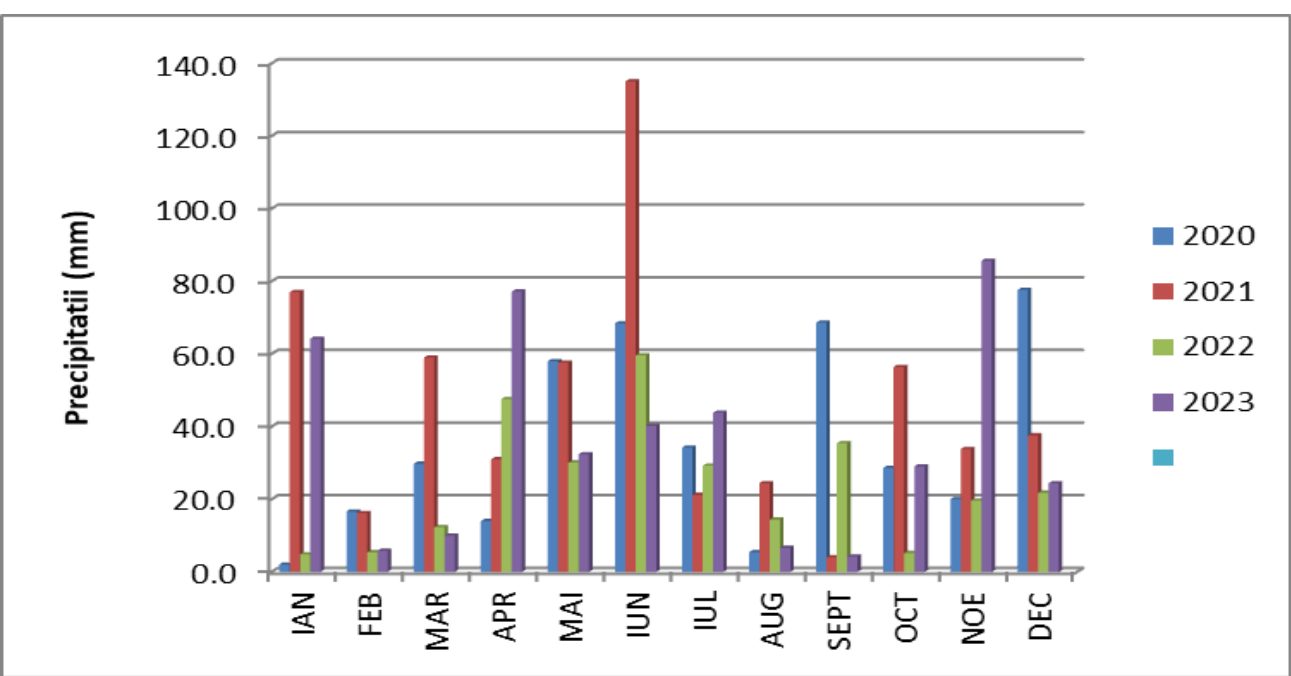
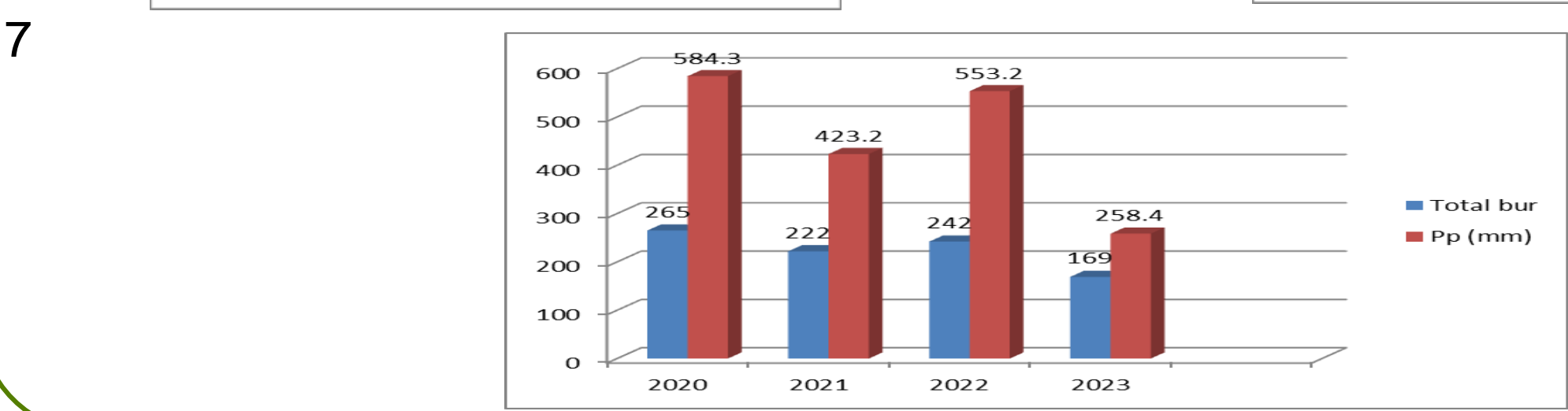
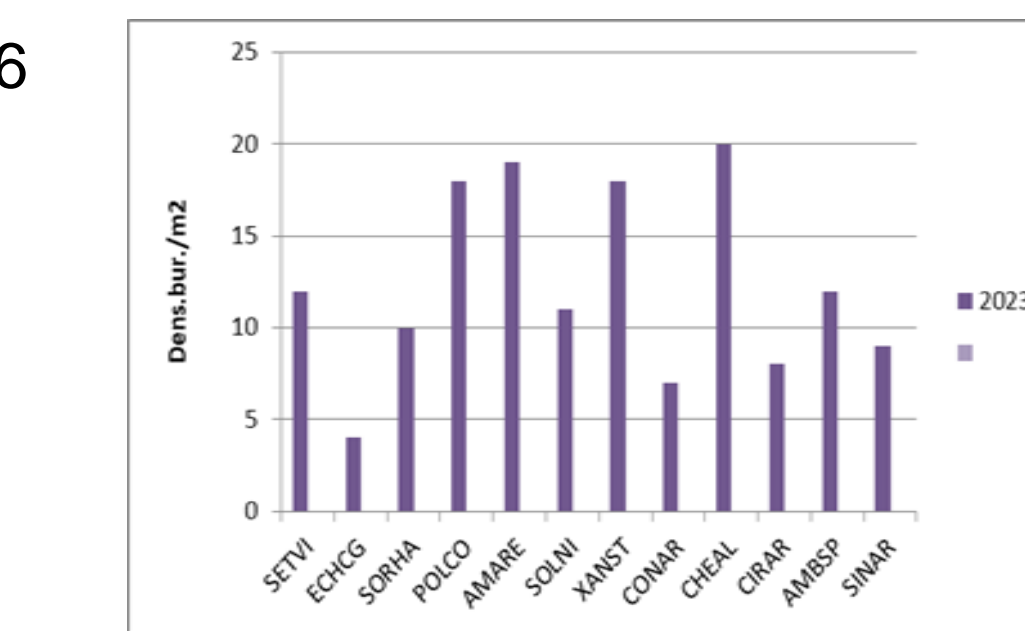
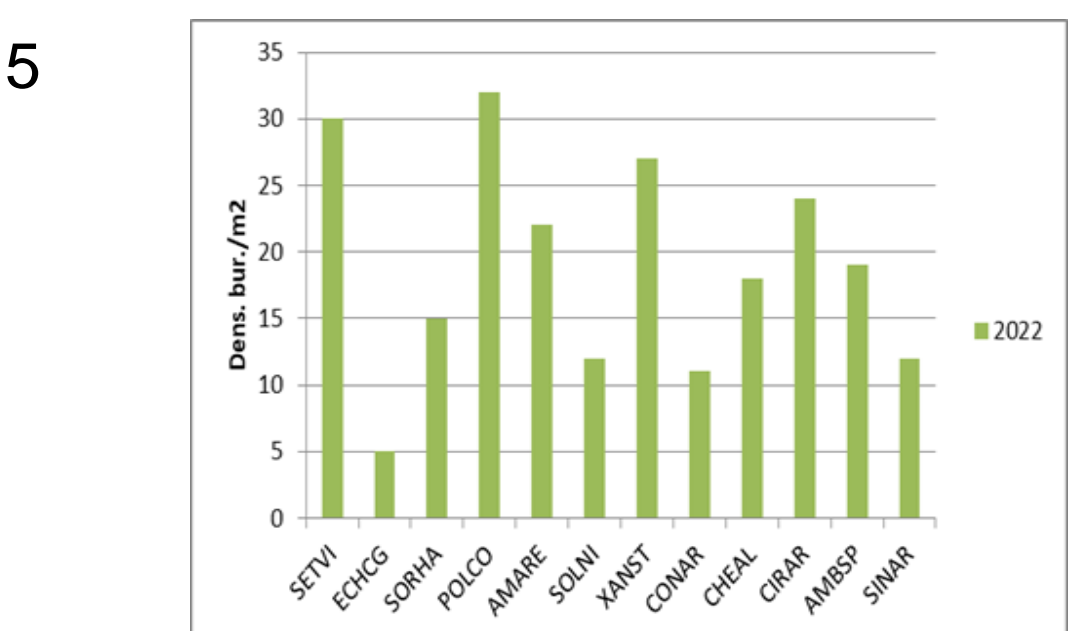
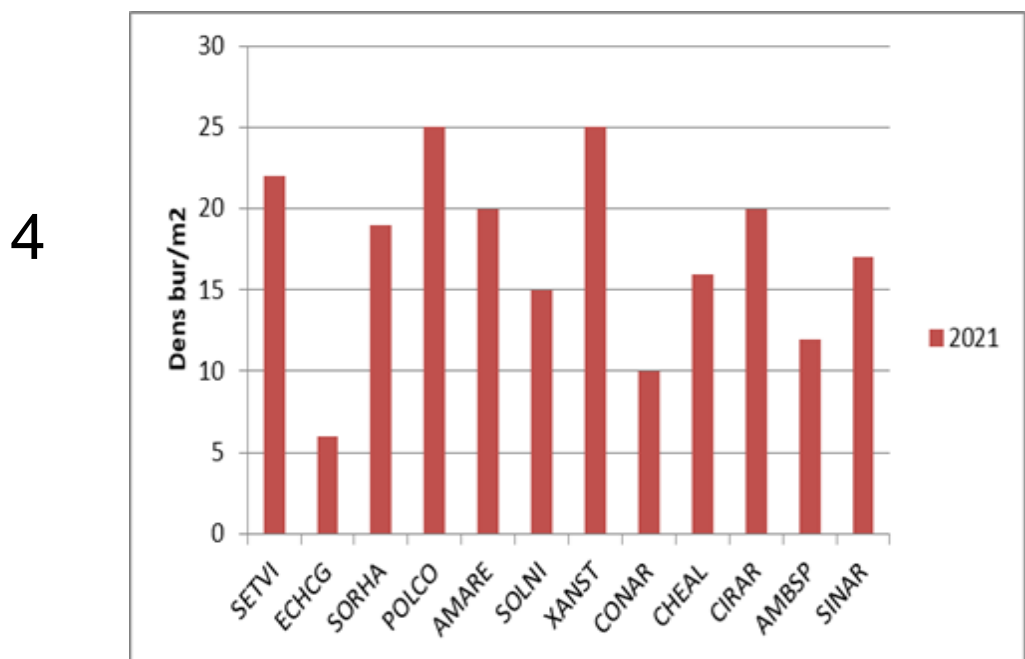
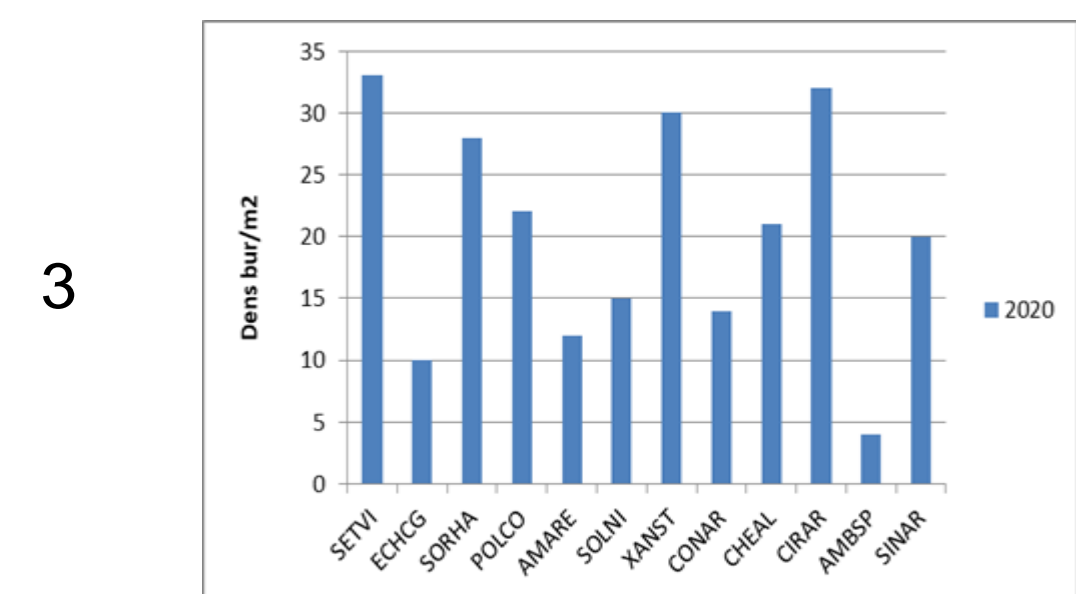


Figure 2. The temperature from NARDI Fundulea



RESULTS AND DISCUSSIONS

The sunflower crop presents a high and different degree of infestation (65-85%) with characteristic species, depending on the location area, the applied technological links and the preceding plant. The study and control of weeds is an important research direction, as they cause damage that can affect production by up to 35% - 70%. The sunflowers crop are advantageous in the fight against weeds due to their biological characteristics. During the first growing season, they are sensitive to weeds, but later, due to their rapid growth and development, the number of leaves and their large surface area, they manage to shade the land.



The crop has a diverse weed infestation level with annual and perennial monocotyledonous and dicotyledonous weeds. The causes of the appearance of different weed species are correlated with the zonal climatic conditions, the seed reserve in the soil and the competition between the plant and the weed. In pedoclimatic conditions specific to the area of NARDI - Fundulea, the sunflower cultivation presents high weed infestation, a weed spectrum and a specific dominance. Weeds are unwanted plants that grow on agricultural land, causing significant damage that results in reduced yields, reduced quality, and increased production costs.

The development and implementation of a complex of measures and methods for combating weeds in agricultural crops requires a thorough study of their lifestyle and behavior in different climatic conditions, due to the fact that weeds have different biological properties compared to crop plants. The most important biological properties of weeds are: - reproduction, longevity, vitality and seed germination; plasticity and adaptability.

The study of the infestations is not an end in itself, but a possibility of knowing the infestations and the floristic composition of weed species. Agricultural damage caused by weeding manifests itself at a quantitative and qualitative level. Damage caused by the proliferation of weeds: deterioration of living conditions for crop plants worsening of the soil thermal regime reduction of the effects of fertilizers increased risk of crop mold making agricultural activities more difficult and delayed significant production losses.

During 2020-2023, in the experimental field, in the non-herbicide variants of the sunflower crop, weed density (Fig.7) was very different due to pedoclimatic conditions (soil type, climatic conditions) such that: 2020 – 241 plants, 2021- 207plants, 2022-227 plants, 2023-148 plants.

Following the study, the most representative weed species (Fig.3-5) were: monocotyledons – *Setaria viridis*, *Echinochloa crus - galli*, *Sorghum halepense*; annual dicotyledons – *Polygonum convolvulus*, *Amaranthus retroflexus*, *Xanthium strumarium*, *Ambrosia.sp.*, *Sinapis sp.*, and perennial dicotyledons – *Convolvulus arvensis*, *Cirsium arvense*.

In non-herbicide variants, precipitation favors the emergence and growth of weeds to the detriment of sunflower plants. Problem weed species (*Sorghum halepense*, *Setaria viridis*, *Cirsium arvense*, *Xanthium strumarium*, *Ambrosia sp.*, *Sinapis arvense*) require special attention.

The evolution of weeds was influenced by the following aspects: - zonal pedoclimatic conditions; -resistance to wintering of weeds; -culture technology; -crop rotation ; -resistance of weeds to the action of herbicides.



CONCLUSIONS

- ❖ The sunflower crop presents a high level of infestation annually, with characteristic species. The causes of the appearance of different weed species are correlated with: zonal climatic conditions, the seed reserve in the soil; competition between the plant and the weed.
- ❖ In the untreated plots, the precipitation favors the emergence and growth of weeds to the detriment of sunflower plants.
- ❖ In non-herbicide sunflower varieties, the population of *Convolvulus sp.* can be a quick estimator of the degree of infestation.
- ❖ Problem weed species (*Sorghum halepense*, *Setaria viridis*, *Cirsium arvense*, *Xanthium strumarium*, *Ambrosia sp.*, *Sinapis arvense*) require special attention.
- ❖ Most weeds demonstrate better adaptation to climate and soil conditions than cultivated plants. Their roots develop at a much faster rate, penetrate deeper and have a high capacity for absorbing nutrients - (nitrogen, phosphorus, potassium). Including water and nutrients present in fertilizers are used in a much higher proportion.

INTERNATIONAL CONFERENCE

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