# THE WEEDS CONTROL IN WHEAT CROP UNDER THE PEDOCLIMATIC CONDITIONS FROM NARDI FUNDULEA

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**Abstract**

Wheat is an important crop affected by many weeds which, fortunately, can be effectively controlled by specific applications of herbicides.This paper present the results obtained at National Agricultural Research and Development Institute Fundulea, during 2023-2024, according to the herbicide treatments: Floramix (70.8 g/kg piroxsulam + 14.2 g/kg florasulam + 70.8 g/kg cloquintocet-mexil - safener) + Dasoil 26-2 N (Adjuvant); Pallas (7.5% piroxsulam + 75% cloquintocet-mexil safener) + Adjuvant; Omnera + Foxtrot 69 EW (135 g/l fluroxypyr + 30 g/l thifensulfuron metil + 5 g/l metsulfuron metil 69 g/l fenoxaprop-P-etil + 34.5 g/l cloquintocet mexil - safener), postemergently (BBCH -31) applied for the weeds controlling .
The herbicides must be correlated with the infestation degree of weed, the spectrum and dominance of weeds, the time of application, the technical potential for efficacy, the local climatic conditions.

**Keywords**: weeds, herbicides, time of application, dose, selectivity and efficacy.

Wheat cultivation is one of the oldest and most important agricultural practices, playing a crucial role in feeding the world and developing society. Wheat is the second largest crop in the world after corn, among the types of large crops, being the most important plant cultivated in over 100 countries. Wheat and its derivatives are part of the current diet, establishing themselves as a staple food, present in daily meals in various forms.

The crop's weed flora is very diverse and numerous, both in terms of the numerical ratio of weed species present, and especially in terms of 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 is cultivated (Anghel *et al.,* 1972).

The presence of weeds in field crops is a reality in all areas where they are grown. The damage caused by weeds can be diverse and often leads to reduced yields, increased production costs, deterioration of product quality, ideal hosts for pathogens and pests, etc. (Mortensen *et al.,* 2000; Roman and Lăzureanu, 2012).

In the field of weed control in field crops, 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 cultivated varieties (Popescu A., 2007).

Weeds have the greatest negative impact, around 37%, compared to insects (18%), fungi and bacteria (16%) and viruses (2%) (Oerke, 2006).

The magnitude of the loss is related to the composition of the weed flora, weed emergence timing in relationship to the crop, weed density, intensity, and crop development stage in relation to the period of competition (Singh *et al.,* 2016).

The aim of the research was to identify technological solutions to control the weeds present in the crop by using the herbicide treatments, aiming to broaden the control spectrum, synergism, persistence and without negative impact on the environment.

The main objective of this paper focused on the study of selectivity and effectiveness of the application of herbicide treatments in the control of weeds in the wheat crop.

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Table 1

**The herbicide treatments applied in the wheat crop. Experimental variants**

| No var | Herbicides treatments | Active ingredient | Dose g,l /ha | Time of application |
|---|---|---|---|---|
| 1 | Untreated | - | - | - |
| 2 | Floramix + Dasoil 26-2 N (Adj) | 70.8 g/kg piroxsulam + 14.2 g/kg florasulam + 70.8 g/kg cloquintocet-mexil (safener) | 260 g/ha + 0,6 l/ha | Postem BBCH 31 |
| 3 | Pallas 75WG + Adj. | 7.5% piroxsulam + 7.5% cloquintocet-mexil safener | 250g+ 0.5 l/ha | |
| 4 | Omnera + Foxtrot 69 EW | 135 g/l fluroxypyr + 30 g/l thifensulfuron metil + 5 g/l metsulfuron metil 69 g/l fenoxaprop-P-etil + 34.5 g/l cloquintocet mexil (safener) | 1.0 l/ha + 1.0 l/ha | |

Table 2

**Monthly average temperature (°C)**

| Temperature (°C) | Mar | Apr | May | Jun | Jul | Aug | Sep | OCT |
|---|---|---|---|---|---|---|---|---|
| 2023 | 8.2 | 10.8 | 16.9 | 22.3 | 26.1 | 26.1 | 21.7 | 16.1 |
| 2024 | 8.5 | 15.0 | 16.4 | 26.1 | 27.7 | 26.3 | 20.0 | 12.7 |

Table 3

**Monthly sum of precipitation (mm)**

| Precipitation (mm) | Mar | Apr | May | Jun | Jul | Aug | Sep | OCT |
|---|---|---|---|---|---|---|---|---|
| 2023 | 10.0 | 77.2 | 32.4 | 40.2 | 43.8 | 6.6 | 4.2 | 29.0 |
| 2024 | 38.6 | 62.4 | 34.2 | 15.6 | 45.4 | 18.0 | 62.0 | 7.8 |

## MATERIAL AND METHOD

The research was carried out in the period 2023-2024, at the National Institute for Agricultural Research and Development - Fundulea, being studied the application of new herbicide treatments at the wheat crop. The research was carried out in the experimental field, the experiment being located on a soil of cambic chernozem type (3.2% organic matter, 37% clay, 6.5 pH), using the Pitar wheat variety created by the institute from Fundulea.

The organization of the experiment was done according to the method of randomized blocks, with a plot area of 25 $m^2$, in 4 replications, the amount of water used was 300 l/hectare. In this experiment, we observed the degree of selectivity of plants and the degree of control of weeds by applying herbicide treatments *(table 1*): Floramix + Dasoil 26-2 N (Adj); Pallas 75WG + Adj.and Omnera +Foxtrot 69 EW. The herbicide treatments were applied in the post-emergence (BBCH-31). After the application of herbicide treatments, observations of selectivity (%) of plants were made at different intervals (7 - 14 - 21 days after the application of treatments) and the degree of control (%) of weeds at different intervals 14 - 21 days from the application of treatments).

During the years 2023 and 2024, the climatic conditions (*table.2, table.3*) recorded at Fundulea were differentiated. The amount of precipitation recorded in 2023 was 423.4 mm and in 2024 it was 437.0 mm. The difference between the two years in terms of precipitation was only 13.6 mm.

## RESULTS AND DISCUSSIONS

The experience of wheat realized in the experimental field showed an infestation degree of 75%, in the culture being present the weeds extremely diversified, depending on: the pre-emergent plant, the local pedo-climatic conditions.

The most representative weed species were: *Anthemis arvensis-ANTAR, Matricaria inodora - MATIN, Galium aparine-GALAP, Papaver rhoeas-PAPRH, Veronica hederifolia-VERHE and Avena fatua -AVEFA.*

Figure 1 **The infestation degree (%) with weeds from the untreated plots.**

***Anthemis arvensis***, also known as field chamomile, is an annual plant in the Asteraceae family, known for its erect and branched stem, reaching up to 50 cm, and for flowers with white

petals at the base and a yellow center, which appear in summer. This species reproduces by seeds, germinates from autumn to spring and can be found in crops and pastures, but also for phytotherapeutic purposes.

***Matricaria inodora*** is a annual plant, frequently found in agricultural crops, where it makes the harvest difficult. It is considered a difficult weed because it can grow very strongly, having a taproot, while the stem can reach 50-100 cm in height. The inflorescence has white ligules, with yellow flowers and a full calatidium inside. A single Matricaria plant can produce up to 5.000 seeds. Germination period: autumn - spring, superficial germination, especially on wet and marshy soils. Flowering period: May - August.

Studies on the competition between M. inodora and various autumn grasses have been carried out more recently (Schlichting, 1986; Ionescu & Ionescu, 2013). Such research falls within one of the new fields of theoretical and applied herbology, namely weed ecology, with the help of which some answers could be found in substantiating the application of the complex of control measures - Integrated Control Management (ICM) of the respective species (Labrada, 1995; Sokal & Rolf, 1981)

A field infested with M. inodora turns golden-white (from the flowers) when the plants have sprouted. From this point until maturity, the infestation is very obvious, as the weed surpasses the crop plants in height.

***Galium aparine*** is considered one of the most harmful weeds. Galium is an annual seed-bearing plant, with a stem covered with clinging hairs, which can reach a height of 2 meters. Gallic acid is rough to the touch and sticky. It prefers fertile soils, rich in humus, but can also be found on moist clay soils. Gallic acid seeds can germinate for over 8 years, and a single plant can produce between 100 and 500 seeds. Germination period: autumn - spring.

***Papaver rhoeas*** is a annual weed with a taproot. A single poppy plant can produce an impressive amount of seeds (10.000-20.000) that retain their germination for up to 20 years. The poppy can reach a height of one meter. It is perhaps the most easily recognizable weed, with solitary, long-pedunculated flowers, usually red, with white, pink or purple variations. The fruits are globose capsules. The poppy belongs to the group of weeds that can overwinter. Germination period: autumn or very early spring. Flowering periods: spring - summer.

***Veronica hederifolia-*** a weed that can survive over winter, rarely annual, light-loving. It prefers light (skeletal) soils, rich in nutrients, sandy-loamy to loamy, rich in calcium.

***Avena fatua*** - Paniculate grass very similar to cultivated oats. It prefers heavy, calcium-rich, cool to moist, clay and loamy soils. Germination period Spring. Germination depth up to 20 cm.

In the experimental field, all the selectivity observations made for the cultivated variety-Pitar, not recorded phytotoxic phenomena (EWRS scale = 0).

In the wheat crop, the herbicide treatments applied post-emergence (BBCH 31) had a good control effect, highlighting their effectiveness through a single application. By applying the treatments with herbicides, good results were obtained regarding the effect of combating weeds, depending on: the climatic conditions, the degree of infestation, the spectrum and the dominance of the species present in this crop.

*Figure 2* shows the average effectiveness results recorded after the post-emergence application of the treatment with Floramix +Dasoil 26-2 N (Adj). In the version treated with Floramix + Dasoil 26-2 N (70.8 g/kg piroxsulam + 14.2 g/kg florasulam + 70.8 g/kg cloquintocet-mexil - safener), it is a new systemic herbicide, with post-emergence application (BBCH 31).

The efficacy results obtained after the application of the treatment show a good control effect (94–100%) for the annual dicotyledons: *Anthemis arvensis, Matricaria inodora, Galium aparine, Papaver sp.,* and *Veronica hederifolia*. The species *Avena fatua* showed a control effect of 94%.

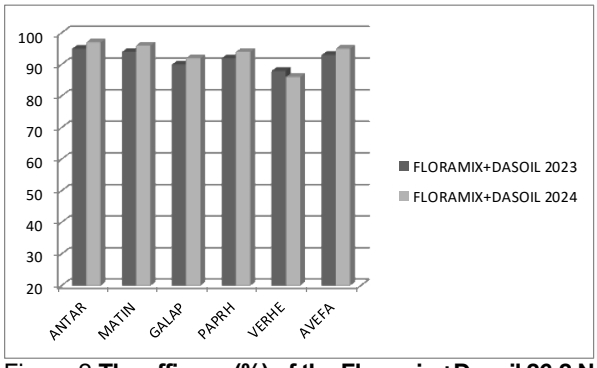


Figure 2 **The efficacy (%) of the Floramix +Dasoil 26-2 N on weeds control from the wheat crop (Fundulea, 2023-2024)**

The next variant treated was with the Pallas 75WG + Adj, is a systemic herbicide, with post-emergence application, intended for the control of grass and broadleaf weeds in wheat crops. Experiments carried out in several countries have not shown any damage to subsequent crops, on different soil types.

Control is influenced by the stage of weed development, with young stages of development being more easily controlled.

The efficacy results (Figure 3) obtained after the application of the treatment show a good control effect (92-97%) for the weeds: *Anthemis arvensis, Matricaria inodora Avena fatua and Veronica hederifolia* -81 %.

The species *Gallium aparine* had a efficacy of 73% and the weed *Papaver sp.,* showed a moderate control – 55%.

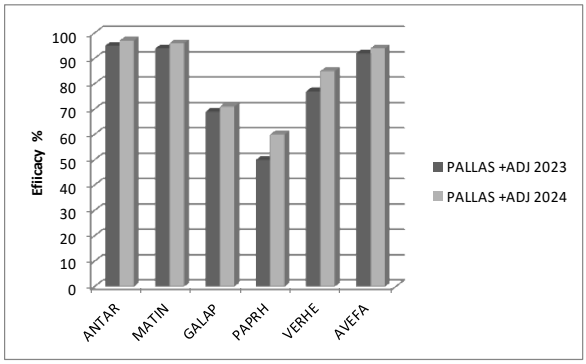


Figure 3 **The efficacy (%) of the herbicides Pallas 75WG + Ad on weeds control from the wheat crop (Fundulea, 2023-2024)**

Figure 4 shows the average efficacy results (%) recorded after post-emergence application (BBCH 31) of the herbicide combination Omnera (1.0 l/ha) + Foxtrot 69 EW (1.0 l/ha).

Omnera herbicide is composed of 3 active substances (fluroxypyr 135 g/l + thifensulfuron methyl 30 g/l + metsulfuron methyl 5 g/l), very effective when applied to small weeds in the active growth phase (2 - 6 leaves). The degree and duration of control may depend on the weed spectrum and degree of infestation, the size of the weeds at the time of application, the technology applied and the environmental conditions during and after treatment.

Foxtrot 69 EW (fenoxaprop-P-ethyl 69 g/l + cloquintocet mexil 34.5 g/l (safener) is a systemic herbicide for controlling annual monocotyledonous weeds, a graminicide dedicated to protecting cereals, selective for the crop due to the safener incorporated in the formulation.

The results obtained show a good control effect (96-100%) for the annual dicotyledons: *Anthemis arvensis, Matricaria inodora, Galium aparine, Papaver sp*., and *Veronica hederifolia.*

The monocotyledonous species *Avena fatua*, after treatment, recorded a very good efficacy - 96%.

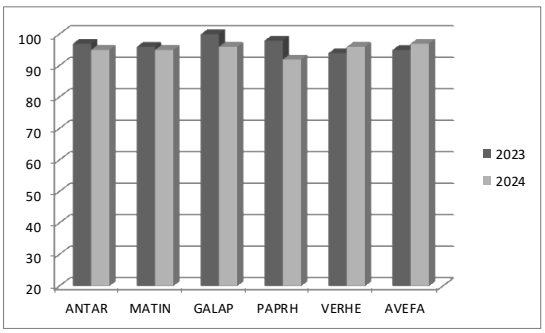


Figure 4 **The efficacy (%) of the herbicides Omnera + Foxtrot 69 EW on weeds control from the wheat crop (Fundulea, 2023-2024)**

In the wheat experiment, the average yield obtained in the control plot was 3.25 t/ha. Following the treatments with herbicides applied to wheat crops, the production was different from treatment to treatment.

The herbicide treatments: Floramix (70.8 g/kg piroxsulam + 14.2 g/kg florasulam + 70.8 g/kg cloquintocet-mexil - safener) + Dasoil 26-2 N (Adjuvant); Pallas (7.5% piroxsulam + 7.5% cloquintocet-mexil safener) + Adjuvant; Omnera + Foxtrot 69 EW (135 g/l fluroxypyr + 30 g/l thifensulfuron metil + 5 g/l metsulfuron metil 69 g/l fenoxaprop-P-etil + 34.5 g/l cloquintocet mexil - safener), postemergently (BBCH -31) applied to the crop, the average production obtained in 2023 recorded the target value: 4.3 - 5.3t/ha. In 2024, the average production obtained was between 5-5.6 t/ha in the treated variants.

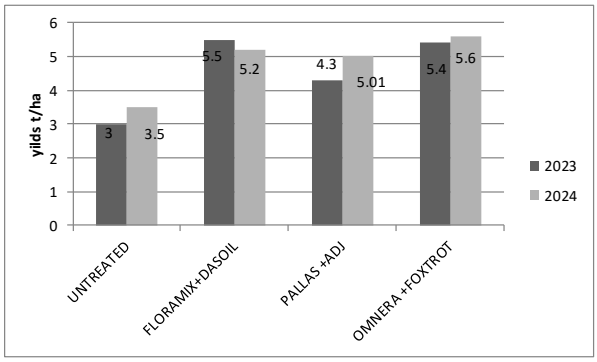


Figure 5 **The wheat yields (t/ha) under the 3 experimental treatments (Fundulea, 2023-2024)**

The chemical control of the weed species existing in the wheat crop, on the type of cambic chernozem soil from Fundulea, represents an especially important and necessary technological measure.

## CONCLUSIONS

The wheat crop showed a high degree of weeding and diversified with characteristic weeds:
- annual dicotyledons: *Anthemis arvense, Matricaria inodora, Galium aparine, Papaver sp., Veronica hederifolia,* and monocotyledon: *Avena fatua.*

In the variants treated with herbicides, no phytotoxic symptoms were recorded for the cultivated variety - PITAR.

The degree of control of herbicide treatments depends on the level of infestation, dominance, weed spectrum, applied dose and climatic conditions.

The yields obtained was in close correlation with: the biological potential of the wheat variety, the efficiency of each treatment and the recorded climatic conditions.

## ACKNOWLEGMENTS

*This paper was supported by the project ADER 2.1.4 ,,Cercetări privind perfecționarea managementului integrat de combaterea buruienilor la principalele culturii de câmp în contextul schimbărilor climatice și a restricțiilor Green Deal privind explotarea durabilă a resurselor de mediu''.*

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