

THE WEEDS CONTROL BY MECHANICAL AND MANUAL MANAGEMENT PRACTICES

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Abstract

New crop conditions considering today the promotion of important measures, including: agricultural sustainability and environmental protection. Control weeds in agricultural ecosystems with soil and plant belongs in each ecological zone. Ecosystems (crops) specific luvic soil are real situations of weed encroachment every year with different species and in large quantities. Among methods of weed control, making new demands hoeing enroll in Europe. Practice these methods proved favorable not only by stopping different degrees of weeding, but also by creating improved physical fitness necessary for the development of plant root systems. The intervention of the weeds, or only mechanical, or only manually, or with, have induced different levels of control in specific crops. Based on these methods, grain yields followed appropriate developments. This study was done in the three directions, with the demonstration plant hoe grown responses under these conditions in farm fields. Each of the four crops is presented: i) the structure of weeds on the four categories (AM, AD, PD, PM), ii) formation of grain production under natural weed encroachment, iii) development to production by hoeing complex in comparison with an-hoed, iv) comparing types of hoeing to control weeds and on this basis, the production of grains formed. Under natural conditions weeds formed averages of total biomass: 14.9 t.ha⁻¹ in maize, 12.3 t.ha⁻¹ sunflower, soybean 11.8 t.ha⁻¹ and 18.1 t.ha⁻¹ beans. Formed grain production under natural weeds encroachment were 2.0-3.0 t.ha⁻¹ in maize, 1.0-1.5 t.ha⁻¹ sunflower, 0.2-1.0 t.ha⁻¹ soybean and 0.2-0.6 t.ha⁻¹ at beans. Weeding complex (mechanical and manual) has improved the average grain yields from an average of: 6.8 t.ha⁻¹ maize, 3.0 t.ha⁻¹ sunflower, soybean 1.9 t.ha⁻¹ and 1.9 t.ha⁻¹ beans. This maximum levels of plants yields expressed also the white luvic soil agri-potential.

Key words: mechanical hoed, manual hoed, complex mechanical & manual hoed, field crops.

INTRODUCTION

Practice of hoeing, using mechanical and manual weed control is applied in all over the world (Derksen et al., 1993; Froud-Williams, 1995; Van Der Weide et al., 1995), just like us (Ionescu et al., 1996). Positive effects have been shown to be important in any culture system. The problem that arises is that if the practice of high density can control weeds, to avoid competition between them, the species and the number per unit area so that this does not incur losses of production (Anghel et al., 1972; Berca and Ciorlăuș, 1994; Cousens & Mortimer, 1993). Today such outcomes are required to guide combat (Wyse, 1994) and farming in environmental protection conditions, or in response to opportunities in small households control of us, which often appeal to hoeing, or mechanical type (often with animal traction) or by hand-digging often. In such

cultural conditions, mechanical weed control by hoeing may have some success and i.e. between 37-95 % regardless of the number of passes through the chain. Mechanically is, however, only effective when taking into account other factors involved in weed populations (Rasmussen, 1992). Thus, in addition to mechanical practices can promote other methods that reduce weed control. Some of them have begun to be applied, and namely: low rates of herbicides, biological control methods, physical methods, so manual methods (Lazauskas, 1995).

Given the fact that the mechanical weeding is not done yet acceptable levels of control of all weeds in weeding, currently us practical and manual weeding (Scurtu, 1996; Ștefaniș & Knezeviș, 1995). Complexity between the two methods is produced by alternating relatively simple: it performs a mechanical shift then immediately hand she is leaving her. After a

period of about 15/12/10 days depending on rainfall, which promotes a new wave of weeding, mechanical longer make a move swiftly followed by hand hoeing. In some years “waves” of hoeing may comprise 1-2, sometimes 3 passes.

On the other hand, the moment or the time of making weed control by mechanical and manual weeding is important because, theoretically, they would be required to be completed as early as possible (Townson et al, 1995). Why this? In practice for control of weed plants by hoed, on finding that the spring weeds found that some time before the crop plants. The reason is that adaptability significantly better weed species have in the culture medium in comparison with the plants in the culture (Aldrich, 1984). This gap between rising grain crop and weed seeds, weed latter ensures their rapid and specific. Against this state, considered particularly dangerous to the success of the crop, it is necessary to take any kind or method of combat, including hoeing (Ammon, 1997). At the same time have known that the weed seedlings or bean- sprung all the species: annual and perennial stems or shoots emerged from underground, where perennial species have a certain vulnerability. The vulnerability of the weed seedlings is affected, and in case of using the compound of hoeing, as with all the measures chemical or non-chemical control of weeds in a crop. Weeds are in a young stage, as noted before the first hoeing (Berca, 2004; Courtney, 1996; Cousens, 1987) and hoeing after each wave of mechanical and manual, not yet producing damage. Biomass and grain damage occurring after some delay.

From research on when to perform multi hoeing, mechanical and manual showed that production losses were steep, very large and not recommended under any circumstances. It is also good to know the fact that the first two weeks (sometimes after a few days), weeds noncombatants from a hoe culture, contributes very strong plants and passes through any mechanical and manual saves culture. It is particularly strong stresses falling crop plants stress which may not be able to exit that culture- appropriate compromise (Auld, 1996). From research results will be presented both separately and in combination mechanical and

manual weeding applied four crops: maize, sunflower, soybean and beans. In such research might find a recommended control response farmers practicing organic farming system with obvious trends, or the enhanced protection of agricultural environment, without any residual.

MATERIALS AND METHODS

Multiannual researches followed on the influence of mechanical and manual, separately and in combination of these, for the main hoed-plant in the area: maize, sunflower, soybean and beans, in several directions. The first study involved quantitative analysis of specific weed species from witness plots (with natural weed), grouped by dominant classes and namely annual monocots (AM), annual dicots (AD), perennial dicots (PD) and perennial monocots (PM). Data demonstrate the importance of each of the four groups of weeds that outcompete the plant. Weed that occurs every year in weeding plants here and highlights the specific nature of existing ecosystems white luvisol the resort.

Over the years of culture, natural weed had varying degrees, depending on the nature of each crop year and considered here as fluctuating. In spring weeds compete both at different times of sowing place in April and May, with favorable influence that early and late species of weeds and climatic conditions by rains falling throughout the growing season. Given the annual competition of weeds and plant production occurred hoes formed under these conditions were found different situations and characteristics of each species in culture. This study expresses levels and degrees of competition between crop plants and weed species existing. Expressions average production by the total biomass of weeds was done by correlation and regression.

A separate study was conducted to compare the average production of variants, the total hoeing weeding degree very low, with and an-hoed variants by any method, specifically the degree of weed. Differences obtained by hoeing complex: mechanical and manual led to obtaining increases very obvious, even spectacular in some years. By hoeing we realize that to remove both competition with weeds and creating conditions expressing an optimum physical condition of the soil of culture.

The results with separate influence of hoes performed separately and in combination, and compared to normal manual weeding could provide genuine opportunities in weed control status of the four cultures hoes. In the fourth study of the level of grain production in the following; i) no-hoed and no-herbicides, ii) mechanical weeding, iii) manual hoeing, and iv) complex mechanical and manual weeding. Graphs highlight possible levels of weed control by any of the four possibilities, the plants grown under white luvisoil.

The experimental variants were located near various herbicide treatments for testing, made under programs established by the special laboratory of herbicides from INCDA Fundulea. Their surface was 25 m² each in four repetitions by the Latin rectangle method. Data processing was done by way analysis of variance (Anova test).

RESULTS AND DISCUSSIONS

A. The natural encroachment of the hoed crops

Over the years it was noticed that there is a substantial natural weeding of hoe plants (Backer, 1988). The causes of this situation is that they have large spread weed species, some of which are downright invasive, and massive storage of their year, the soil seed bank, and great susceptibility (the relatively weak the competition) of the four crops. Within several years weeding took place differently in each culture (or ecosystem). The data obtained over a long period of years have shown that there are some years, the plants produced more grain yield compared to previous years, due to climatic conditions that favor the existence of the earlier emergence of the crop plants against weeds. In other years, due to fierce competition with weeds, plants formed less useful production (seeds) or nothing (Ionescu, 2001; Morin et al., 1993). The phenomenon is often observed in maize, but this is true for other hoes plants. Nothing natural weed, i.e. that which occurs each year as a result of acclimatization weed species in agricultural ecosystems found that the annual oscillations with minimum and maximum limits which together provide an overview of the natural phenomenon of weed culture weeding plants.

B. The hoed systems efficacy in maize crop

In maize, weed every year demonstrated specific situations considered important (Benoit et al., 1996; Beraru, 1997). In terms of weed species composition, dominance resulted annual monocots type: *Echinochloa crus-galli*, *Setaria glauca*, *Digitaria sanguinalis*. They attended the annual dicots of which were present as *Amaranthus retroflexus*, *Galinsoga parviflora*, *Chenopodium album*. Perennial dicots were *Cirsium arvense*, *Convolvulus arvensis*, *Sonchus arvensis* and perennial monocots they were represented on *Agropyron repens* and *Cynodon dactylon*. Growth out very clearly the dominant species- AM, intermediate species- AD and the raced- PD and PM. The total biomass of these four categories of weeds amounted on average to 14.9 t.ha⁻¹ (Figure 1). The study demonstrated the influence of natural weed vegetation (Mortensen et al, 2000) in the production of maize grain without hoeing or other methods of control (maize no-hoed). From the graph it appears that in one year is not formed maize, and the other year more than 2 t.ha⁻¹ grains. Developments of maize by performing mechanical and manual hoeing (complex hoeing)- bold line, with yields obtained by no-hoed- thin line, demonstrating the variety of maize culture conditions in this area. In the hoed variant there is an upward trend in yields over time constitutes a promotion hybrids increasingly improved genetic characters. In some years and the differences of hoed and no-hoed were placed in the addition of about 5 t.ha⁻¹. Average study period shows increases of 3.84 t.ha⁻¹ maize. Grain yield showed growth by mechanical hoeing, by hand hoeing and in complex mechanical with the manual. Over several years, only mechanical hoeing weeds contained in the sensitive unsatisfactory even no-complete and in these conditions the addition of maize production was only 0.92 t.ha⁻¹ grains. Breeding only manually proved to be more effective even in addition the production obtained was 2.89 t.ha⁻¹ up no-hoed. The combination of the two hoeing: the mechanical with manual leading to the production of maize term average of 6.79 t.ha⁻¹. Under these conditions the maximum effectiveness of mechanical and manual hoed resulted in maize an increase of 3.84 t.ha⁻¹ grains.

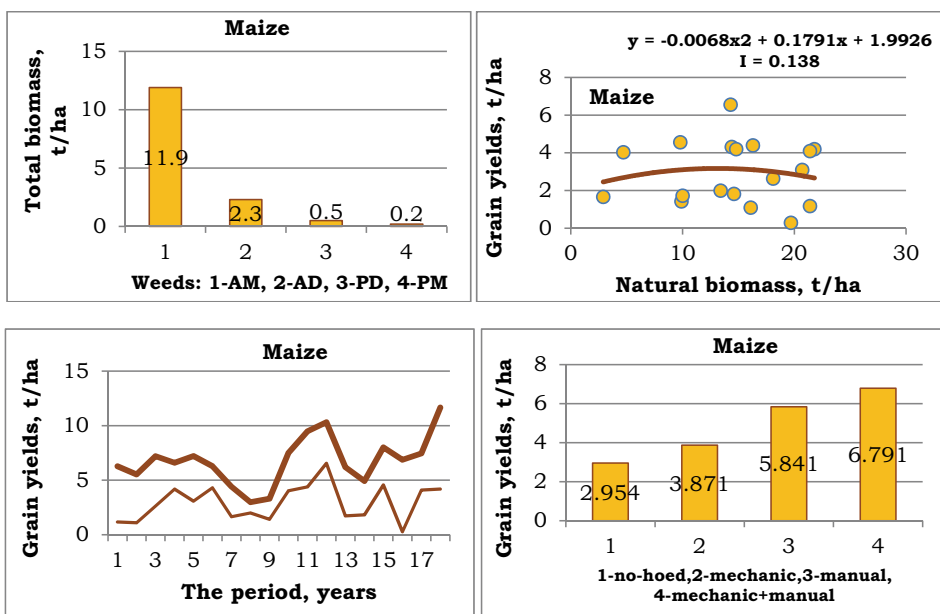


Figure 1. The weed encroachment state and the hoed systems efficacy in maize crop

C. The hoed systems efficacy in sunflower crop

The sunflower generally multi degree of weed was slightly reduced compared to maize. The explanation lies in the fact that this plant growing battle (concurring) something better with weeds. Thus, annual monocots weighted on average $8.6 \text{ t}\cdot\text{ha}^{-1}$. Annual dicots close of maize were $2.6 \text{ t}\cdot\text{ha}^{-1}$. Perennial dicots plants have competed sunflower more, so that under these conditions were made $1.0 \text{ t}\cdot\text{ha}^{-1}$ on average. Their value amounted on average to $12.3 \text{ t}\cdot\text{ha}^{-1}$ biomass of weeds. The dominant species are broadly the same as for maize (Figure 2).

Grain yield of sunflower was formed by natural weed and relatively better, i.e. between 1.5 and $1.0 \text{ t}\cdot\text{ha}^{-1}$, so the downward trend. In the few years a more favorable culture of sunflower plants have won most of the battle with weeds. In other years, however, sunflower produced between 1.1 and $0.7 \text{ t}\cdot\text{ha}^{-1}$ grains. In a single year was an exception, when sunflower plants produced $1.9 \text{ t}\cdot\text{ha}^{-1}$ seeds, no control of weeds given by any means including hoeing. Performing manual and mechanical hoeds influence on the plant was more important in the control of weeds, in comparison with no-hoed. Complex formed by hoeing productions

ranged from an average of $3.04 \text{ t}\cdot\text{ha}^{-1}$ grains. By no-hoed were lost in the same period about $1.68 \text{ t}\cdot\text{ha}^{-1}$ sunflower seeds. In witness no-hoed sunflower produced an average of $1.37 \text{ t}\cdot\text{ha}^{-1}$ grains, while the mechanical hoeing average stood at $2.07 \text{ t}\cdot\text{ha}^{-1}$. The difference is $0.70 \text{ t}\cdot\text{ha}^{-1}$ grains. Weeding manually only contribute to relatively hardware control of the weed species, such as sunflower medium reached $2.92 \text{ t}\cdot\text{ha}^{-1}$. Weeding provide training in complex environments sunflower production of $3.04 \text{ t}\cdot\text{ha}^{-1}$.

D. The hoed systems efficacy in soybean crop

Soybean showed high degrees of weed when no action is taken to control the type hoed. Given the relatively small port of the plant and the slow pace of grown in the first month of vegetation, weeds that occur each year are in significant quantities, regardless of the suitability of the year. Out of weeds produced natural weed encroachment witness, annual monocots totaled $7.1 \text{ t}\cdot\text{ha}^{-1}$. Annual dicots were $3.6 \text{ t}\cdot\text{ha}^{-1}$ and less than $1.0 \text{ t}\cdot\text{ha}^{-1}$ perennial species. The weed species were observed due to soybean, maize and sunflower were approximately similar. The total biomass of weeds in soybean ranged on average from $11.8 \text{ t}\cdot\text{ha}^{-1}$ (Figure 3).

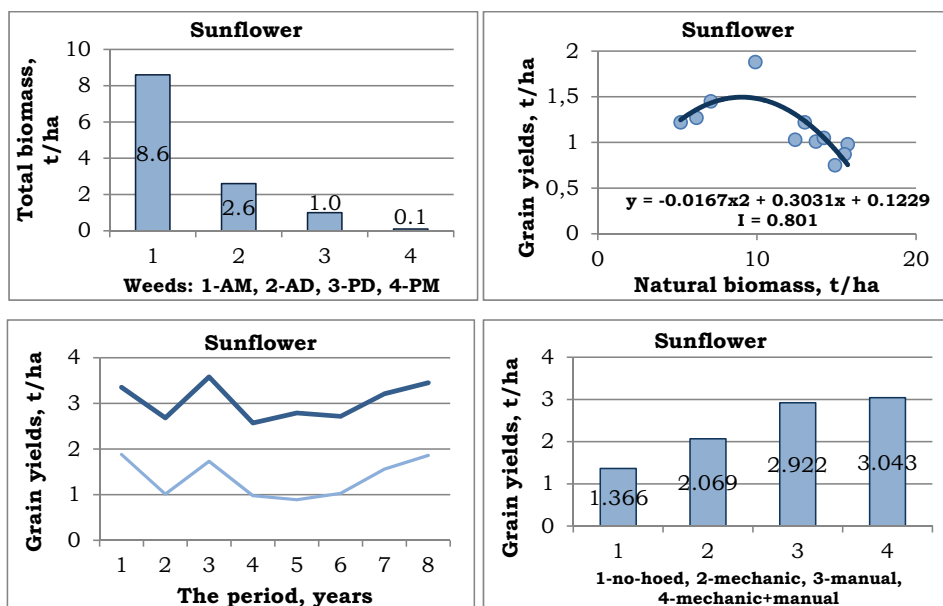


Figure 2. The weed encroachment state and the hoed systems efficacy in sunflower crop

In soybeans, the impact they have had and they have naturally grown weeds is particularly strong. The witness obtained with weeds shows decreasing trend of grain production of up to $0.3 \text{ t}\cdot\text{ha}^{-1}$ amid weeds quantities and formats i.e. between $3\text{-}4 \text{ t}\cdot\text{ha}^{-1}$ in the least favorable to them and $18\text{-}20 \text{ t}\cdot\text{ha}^{-1}$ in the year's wet. The large differences between the outputs of soybean hoed obtained by carrying out the mechanical and manual are considered high compared with no-hoed, important. Thus, if the hoeing complex formed $1.94 \text{ t}\cdot\text{ha}^{-1}$ average grain to no-hoed were obtained only $0.51 \text{ t}\cdot\text{ha}^{-1}$. The average difference over several years was $1.43 \text{ t}\cdot\text{ha}^{-1}$ grains. The intervention on the particular weed and demonstrate a gradual evolution in culture soybean. Thus, the formed blank no-hoed $0.51 \text{ t}\cdot\text{ha}^{-1}$ beans. By performing only breeding mechanical grain yield increased from $0.87 \text{ t}\cdot\text{ha}^{-1}$, so win a gain of only $0.36 \text{ t}\cdot\text{ha}^{-1}$. Manual weeding contributed to the average level of $1.43 \text{ t}\cdot\text{ha}^{-1}$ grains. By combining mechanical with manual hoed were obtained $1.94 \text{ t}\cdot\text{ha}^{-1}$ soybeans production across media considered for many years as good.

E. The hoed systems efficacy in beans crop

Beans bean (crop field) approaches the port in the first growing phenophases but bean plants through the growing season in a shorter time

and therefore control as early and completely provide conditions for yields grain far superior. During the period studied weeds formed from the four specific groups. Were dominant annual monocots, who had a level of $11.3 \text{ t}\cdot\text{ha}^{-1}$, followed by annual dicots with $5.1 \text{ t}\cdot\text{ha}^{-1}$. Perennial dicots produced $1.4 \text{ t}\cdot\text{ha}^{-1}$ and perennial monocots $0.3 \text{ t}\cdot\text{ha}^{-1}$. This amount was set to $18.1 \text{ t}\cdot\text{ha}^{-1}$ (Figure 4).

Bean production in natural weeds witnesses over the years ranged between 0.2 and $0.6 \text{ t}\cdot\text{ha}^{-1}$. Given the high production potential of varieties of beans used considered by annual weeds without control by hoeing, is particularly harmful. It proved so bean plants rapidly and almost completely lost the competition for growth factors. Between hoed culture and the no-hoed beans were found large differences in production. By cultivating these varieties produced an average of $1.87 \text{ t}\cdot\text{ha}^{-1}$. No-hoed produced an average only $0.40 \text{ t}\cdot\text{ha}^{-1}$. This difference further by hoeing complex was of $1.46 \text{ t}\cdot\text{ha}^{-1}$. The differences between the four states of weed control were clear. In the check plot has been formed only $0.404 \text{ t}\cdot\text{ha}^{-1}$ grain. The yield obtained by carrying out the mechanical hoed was at $0.726 \text{ t}\cdot\text{ha}^{-1}$ seeds, with the help of hand hoed the yield was $1.737 \text{ t}\cdot\text{ha}^{-1}$ grains and by hoeing combination of mechanical and hand, $1.868 \text{ t}\cdot\text{ha}^{-1}$.

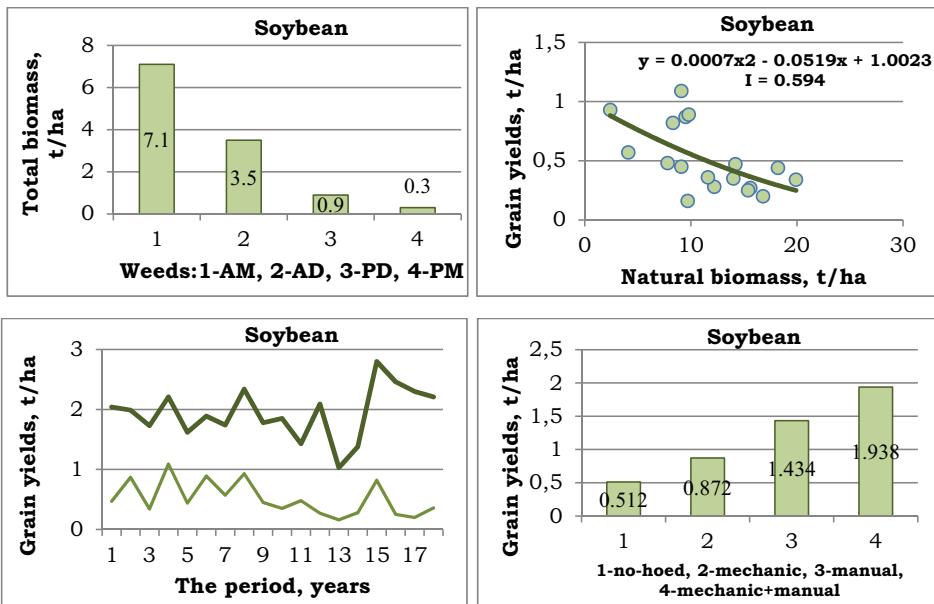


Figure 3. The weed encroachment state and the hoed systems efficacy in soybean crop

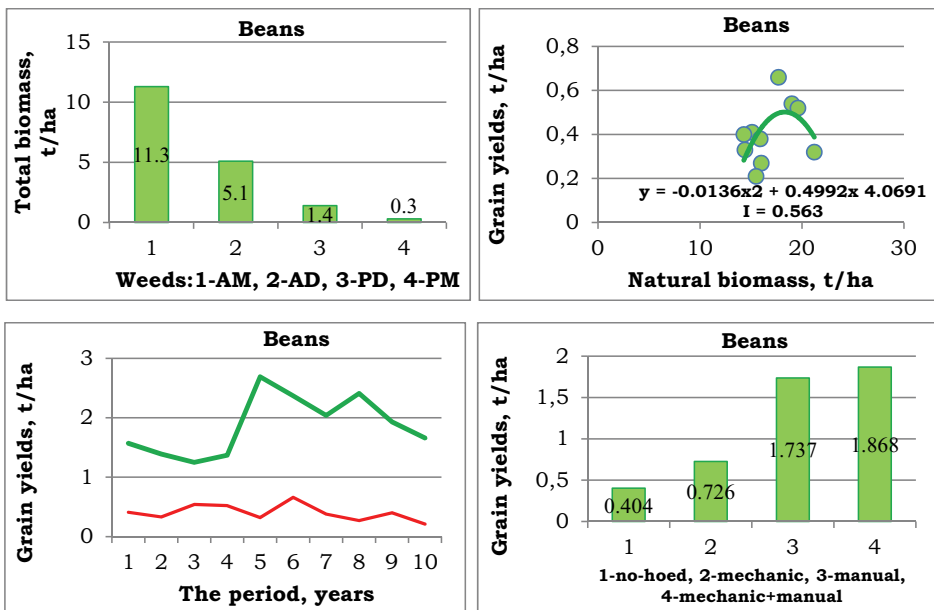


Figure 4. The weed encroachment state and the hoed systems efficacy in beans crop

CONCLUSIONS

Control of weeds by hoeing is part of new European rules for the protection of agricultural environment. Although it is known for a long time, it is not known multi influence both the mechanical hoed, of the hand and the

combination of them. Research of this kind in the southern white luvic-soils novelty dress. The weeds occurring in spring crops: maize, sunflower, soybean and beans are the dominant annual monocots (AM, 80% maize, 70% sunflower, soybean 60% to 63% of the beans) and is followed by annual dicots (15% maize, 21% sunflower, 30% soybean and 28% beans).

The other two groups, PD and PM were much lower proportion (5% maize, 9% sunflower, 10% soybean and 9% beans).

Plant vegetation with weed hoe culture showed high inter-specific competition. And in these circumstances, production of grain size, but at low levels: 2.9 t.ha⁻¹ maize, 1.0-1.5 t.ha⁻¹ sunflower, 1.0-1.3 t.ha⁻¹ in soybean and 0.2-0.5 t.ha⁻¹ beans.

Control weeds by hoeing perform both mechanical and manual kept the clean cultures. Production increases obtained were very evident in all periods studied. Maximum yields obtained throughout the period studied were 6.79 t.ha⁻¹ maize with an increase of 3.84 t.ha⁻¹ grain in comparison with no-hoed. Sunflower yield was 3.04 t.ha⁻¹, increase with 1.68 t.ha⁻¹. Soybean produced 1.94 t.ha⁻¹ with increase of 1.43 t.ha⁻¹, and the maximum yield of grain beans was 1.87 t.ha⁻¹ an increase of 1.46 t.ha⁻¹. Hoed whether manual or mechanical showed intermediate situations.

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