

**EFFECT OF WEED COMPETITION PERIODS,
SOWING SYSTEMS AND METHODS OF
CONTROL ON FABA BEAN (*Vicia faba* L.)**

By

RAGAB ABSY IBRAHIM ABO-EBAID

B.Sc. Agric. Sci.(Agronomy), Fac. Agric., Cairo Univ., Egypt, 2002

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Approval Committee

DR.MOHAMMED TAHER BAHGAT FAYED.....
Professor of Agronomy, Faculty of Agriculture, Ain Shams University

DR.SHABAN ABD-ELHADY SHABAN.....
Professor of Agronomy, Faculty of Agriculture, Cairo University

DR.MAHMOUD HUSSEIN EL-DEEK.....
Professor of Agronomy, Faculty of Agriculture, Cairo University

DR.EZZALDIN OMAR ABUSTEIT.....
Professor of Agronomy, Faculty of Agriculture, Cairo University

Date: 19 / 12 /2010

SUPERVISION SHEET

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SUPERVISION COMMITTEE

Dr. EZZALDIN OMAR ABUSTEIT
Professor of Agronomy, Fac. Agric., Cairo University

Dr. MAHMOUD HUSSEIN EL DEEK
Professor of Agronomy, Fac. Agric., Cairo University

Name of Candidate: Ragab Ibrahim Abo-Ebaid **Degree:** M .Sc.
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Prof.Dr. Mahmoud Hussein El-Deek
Department: Agronomy
Approval:19/12/ 2009

ABSTRACT

Four field experiments were carried out at Experim. and Agric. Res. St., Fac. of Agric., Cairo Univ. The objectives are, to define the critical period of weed competition in faba bean, explore weed communities, determine the effects of planting systems on weed control and crop yield and to determine the effects of weed control treatments on weed growth and crop yield. The best weed suppression was reduced in plots kept weed free for all the season, or for 12 weeks after sowing. Short period of weed –crop competition improved weed control. Allowing weeds to grow for the whole season or for 12 weeks after sowing markedly decreased seed yield per plant and per feddan. Planting the crop on both sides of ridges (heavy density) produced more suppression of weeds than that of planting on one side only of the ridge.

Keeping faba bean free from weeds for the whole season or for 12 weeks after sowing resulted in superiority in seed productivity per plant and per feddan.

The best treatments in weed suppression were hoeing (twice or once) and hand weeding, leading to the best faba bean yield and yield components. Applying Fluazifop-p-butyl or clethodim plus hoeing gave better yield. Treating either fluazifop-p-butyl or clethodim at recommended rates gave considerable control of weeds leading to better seed yield.

Key words: Faba bean, Weed Competition Period, Sowing Systems, Weedy, Weed free, Hoeing, Weed Control, Fluazifop-p-butyl, Clethodim and Glyphosate.

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تأثير فترات منافسة الحشائش ونظم الزراعة وطرق المقاومة على الفول

رسالة مقدمة من

رجب عيسى ابراهيم ابو عبيد
بكالوريوس فى العلوم الزراعية (محاصيل)- كلية الزراعة- جامعة القاهرة، ٢٠٠٢

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(محاصيل)

قسم المحاصيل
كلية الزراعة
جامعة القاهرة
مصر

٢٠١٠

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(محاصيل)

مقدمة من الطالب

رجب عيسى ابراهيم ابو عبيد
بكالوريوس فى العلوم الزراعية (محاصيل) - كلية الزراعة - جامعة القاهرة، ٢٠٠٢

لجنة الاشراف

دكتور/ عز الدين عمر ابوستيت
استاذ المحاصيل - كلية الزراعة - جامعة القاهرة

دكتور/ محمود حسين فرحات الديك
استاذ المحاصيل - كلية الزراعة - جامعة القاهرة

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بكالوريوس فى العلوم الزراعية (محاصيل)- كلية الزراعة- جامعة القاهرة، ٢٠٠٢

لجنة الحكم

- دكتور/ محمد طاهر بهجت فايد.....
استاذ المحاصيل - كلية الزراعة- جامعة عين شمس
- دكتور/ شعبان عبد الهادى شعبان
استاذ المحاصيل - كلية الزراعة- جامعة القاهرة
- دكتور/ محمود حسين الديك
استاذ المحاصيل- كلية الزراعة- جامعة القاهرة
- دكتور/ عز الدين عمر ابوستيت.....
استاذ المحاصيل - كلية الزراعة- جامعة القاهرة

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المشرفون : دكتور : عز الدين عمر ابوستيت
دكتور : محمود حسين فرحات الديك

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المستخلص العربي

نفذت ٤ تجارب حقلية في محطة التجارب الزراعية، كلية الزراعة، جامعة القاهرة خلال الموسمين ٢٠٠٥/٢٠٠٦ و ٢٠٠٦/٢٠٠٧ على التوالي. خصصت تجربتين منها لدراسة تأثير الفترات الحرجة لمنافسة الحشائش على محصول الفول البلدى بينما كانت التجربتين الاخرين لدراسة طرق مقاومة الحشائش و أثرها على المحصول. وقد ظهر من النتائج ان محصول البذور قد تحسن بتقصير مدة منافسة الحشائش لنباتات الفول و ذلك بالمحافظة على الحقل خاليا من الحشائش طول الموسم او لمدة ٩ او ١٢ اسبوع بعد الزراعة (١٧٥% - ١٧٨% زيادة في محصول الفدان بالمقارنة بالقطع التى تركت دون مقاومة فى الموسم الاول و ١٩٧.٢% - ١٩٨.٦% خلال الموسم التجريبي الثانى على التوالي . و ظهر من النتائج ان الزراعة على ريشتى الخط خفضت من الوزن الاخضر للحشائش العريضة و الرفيعة الاوراق كما أعطت زيادة فى متوسط انتاج البذور للفدان اكثر من الزراعة على الريشة الواحدة. وانخفض محصول البذور من ١.٥ طن للفدان فى القطع الخالية من الحشائش طول الموسم الى ٠.٥ طن للفدان فى القطع التى تركت دون مقاومة. كما وجدت اختلافات طفيفة فى محصول البذور بين معاملتى القطع الخالية من الحشائش لفترات ٣ و ٦ اسابيع بعد الزراعة. و اوضحت النتائج تفوق معاملات العزيق على باقى المعاملات فى حفظ اعداد الحشائش ثم الجرعات المنخفضة للمبيدات مع العزيق ثم الجرعات الموصى بها. و فيما يخص محصول البذرة للفدان فان العزيق مرتين اعطى (١.٠٩ - ١.٧٢ طن) ثم النقاوة اليدوية (١.١٥ - ١.١٩ طن) والعزيق مرة واحدة (٠.٧٧ - ١.٥٢ طن) فى كلا الموسمين على التوالي. و جاءت فى المرتبة الثانية معاملات رش الفيوزيليد بالجرعة المنخفضة مع العزيق (٠.٧٩ - ١ طن) ثم السلكت بالجرعة المنخفضة مع العزيق (٠.٦٩ - ٠.٧٩ طن) فى كلا الموسمين على التوالي. و كذلك اعطت معاملات المبيدات بالجرعة الموصى بها زيادة فى المحصول (٠.٥٨ - ٠.٧٩٩ طن) فى معاملة الفيوزيليد و فى معاملة السلكت (٠.٤٥ - ٠.٥٧ طن) فى كلا الموسمين على التوالي. و كانت اقل المعاملات رش الجليفوسات مع الجرعات المنخفضة من الفيوزيليد او السلكت والكنترول (بدون مقاومة).
الكلمات الدالة: الفول البلدى، فترات المنافسة الحشائش، نظم الزراعة، طرق المقاومة، فيوزيليد سوبر، سلكت سوبر، جليفوسات.

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INTRODUCTION

Seed legumes are the major source of protein in human and animal nutrition. They play a key role in crop rotations in most parts of the world. Cultivated faba bean is used as human food in developing countries and as animal feed in others. It can be used as a vegetable, green or dried, fresh or canned. It is one of the most important winter crops for human consumption in the Middle East (Bond *et al.*, 1985). When grown in rotation, they can improve soil fertility. Weeds are a major problem in bean production by reducing yields through direct competition for environmental resources available in limited supply (light, moisture, nutrients and space) as well as harbor insects and diseases. The critical period of weed competition has been defined as the period during which weeds must be controlled to prevent yield losses. Since the concept of critical period was introduced, it has been used to determine the period when control operations should be carried out to minimize yield losses for many crops. The length of the critical period of weed control may vary depending on the acceptable yield loss.

Early season competition of weed is extremely critical and major emphasis on control should be made during that period. Weeds present at harvest reduced harvest efficiency and increased mechanical damage to the pods (Stall, 2006). Competition had been defined as " the tendency of neighboring plants to utilize the same quantum of light, ions of mineral nutrient, molecules of water, or volume of space". As a consequence, weeds may significantly reduce yield and impair crop

quality, resulting in financial loss to the grower. Thus, it has been estimated that on global basis weeds are considered to be responsible for competition 10% reduction of the crop yield (Froud-Williams, 2002).

Therefore, the strategy should be to control early emerging weeds and not wait for late weed flushes. Weeds that emerge later in the season will have minimal impact on crop yield and their seed production will also be reduced by crop competition. (Shrestha, 2007).

In general, early emerging weeds pose the greatest threat to crop yields and should be controlled chemically or mechanically before planting or at an early stage of crop growth. To prevent yield loss it might not be necessary to control weeds for the entire crop growing season. There is a certain window during the crop's life cycle when it is most susceptible to competition from weeds. This "critical period for weed control" is defined as the time-interval during which weeds must be controlled to prevent unacceptable yield losses. Weeds compete with the beneficial and desired vegetation, reducing the yield and its quality. However, it is widely known that losses caused by weeds exceed the losses from any category of agriculture pests, such as insects, nematodes, diseases, rodents, etc. of the total annual loss of agriculture produce from various pests, weeds account for 45%, insects 30%, diseases 20% and other pests 5% (Rao, 1992).

Weeds compete with crop plants for nutrients, soil moisture and sunlight. The intensity of weed competition depends up on; a) type of weed species, b) severity of weed infestation, c) duration of weed

infestation, d) competing ability of crop plants, e) climatic condition which affect weed and crop growth.

Reduction in crop yield has a direct correlation with weed competition. Generally an increase in one kilogram of weed growth corresponded to a reduction in one kilogram of crop growth. (Rao, 1992).

Increasing production demands controlling pests infestations and weeds are the most important one. (Abo- EL- Kheer *et al.*, 1988). Faba bean is very sensitive to weed competition and the effect of weed interference on its productivity need to be studied. Seed yield of faba bean was markedly reduced more than 30 % (EL-Bially and Abd El-samie., 1996).

Potential crop yield loss resulting from a given weed population has been predicted using several approaches. The simplest approach involves relating yield loss empirically to weed density. When yield loss is plotted as a function of weed density, yield loss typically increases linearly with increased weed density at low to moderate densities and reaches an asymptotic maximum at high weed densities. This type of sigmoidal curve is usually described mathematically as an exponential or hyperbolic function (Cousens, 1992). When two plants are in close proximity to each other resources such as water, light, and nutrients may become insufficient for optimum growth of each plant (Radosevich *et al.*, 1997). If one plant is able to acquire resources more efficiently than another or if one plant can better tolerate the resource reduction, then that individual plant will have a competitive advantage over the other (Tilman, 1997).

The objectives of this study were to:

1. Define the critical period of weed control.
2. Test the significance between different weed-free periods.
3. Explore the weed communities in Faba bean field.
4. Evaluate the relationship between the periods of weed control and yield losses.
5. Determine the effects of planting systems on weed control and crop yield.
6. Determine the effects of some weed control treatments on weed communities as well as crop growth and yield.