



Study of Lentil (*Lens culinaris* Medik.) Seed Size on Germination and Seedling Properties in Drought Stress Condition

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Abstract

Poor establishment of seedling due to both drought and lack of water is one of the most important problems in arid and semiarid regions such as Iran. So, in order to evaluate the effect of lentil seed size on germination and seedling growth properties affected by drought stress, a completely randomized design with factorial arrangement and 3 replications conducted using two lentils genotypes (Robatt and Gachsaran), two small and large seed sizes (34.8 and 59 mg in Robatt and 41.5 and 69 mg in Gachsaran per seed), respectively and five drought levels (0, -2, -6, -12 and -18 bar) in 1387. Results showed that all of studied traits (R/H ratio except) were affected by seed size, genotype and drought, significantly. Small seeds sizes had highest percent and rate germination, radicle and hypocotyle length and weight. But radicle/hypocotyle ratio of large seed was higher. Robatt was performance for total trait significantly. With increasing in drought intensity, trait values had significant decreases. Also double and triple interactions between factors were significant. Overall it seems that small seed size show more tolerance to drought and genotype with small seed size are performance in this condition.

Keywords: Drought stress, Germination Lentil, Seed size

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The Effect of Irrigation Intervals and Intercropped Marjoram (*Origanum vulgare*) with Saffron (*Crocus sativus*) on Possible Cooling Effect of Corms for Climate Change Adaptation

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Abstract

In order to study the effect of irrigation intervals and intercropped marjoram (*Origanum vulgare*) (as a shading crop for reducing the possible effects of soil warming due to climate change) on the growth and yield of saffron (*Crocus sativus*), a field experiment was conducted as split-plot based on randomized complete block design with three replications, during 2008 and 2009 at the Agricultural Research Station of Ferdowsi University of Mashhad, Iran. Three irrigation intervals (every 7, 14, and 21 days) and three planting combinations (1:0 (pure stand of saffron), 1:1 (one row of saffron + one row of marjoram), 2:1 (two rows of saffron + one row of marjoram) and 3:1 (three rows of saffron + one row of marjoram)) were allocated to main and sub plots, respectively. Results indicated that the simple effects of irrigation interval and planting combination on the flower number, flower weight and economical yield of saffron were significant ($p \leq 0.01$). Also, the interaction effects between irrigation interval and planting combination on the flower number, flower weight and economical yield of saffron were significant ($p \leq 0.01$). The highest and the lowest of saffron economical yield were observed in the irrigation intervals with every 14 (0.27 g.m^{-2}) and 7 days (0.09 g.m^{-2}), respectively. Also, the maximum and the minimum economical yield of saffron were observed in 1:1 (0.20 g.m^{-2}) and pure stand of saffron (0.15 g.m^{-2}), respectively. With increasing irrigation intervals, the growth characteristics and economical yield of saffron were enhanced. It seems that the intercropped saffron with marjoram increased the flower number and economical yield of saffron due to decreasing soil temperature which could be regarded as an alternative to the possible effect of soil warming for climate change adaptation.

Keywords: Climate change, Intercropping, Irrigation frequency, Marjoram, Saffron

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Comparison of Water Use Efficiency between some Crops and Medicinal Species

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Abstract

Increasing water use efficiency is one of the cases to arrive to the stability production. In order to estimation and comparison of water use efficiency among crop species including corn, safflower, sesame, and medicinal species including hemp, marsh mallow, white mallow. An experiment was conducted during 2009 growing seasons in the Agriculture research Station Ferdowsi of Mashhad. The experiments was white mallow established as a completely randomized block design with three replication and six treatments included six crop corn, safflower, sesame as crop plant and hemp, marsh mallow, white mallow as medicinal crop. Results showed that the treatments had significant effect ($p \leq 0/01$). The highest value of water use efficiency were obtained in Corn by 1/84 g per kilogram by 6770 m³ watered requirement and lowest value obtained in white mallow by 0/04 g per kilogram by 7530 m³ watered requirement. However the highest value of harvest index was 41/57 percent in Marsh mallow and lowest value was 9/2 percent in marsh mallow.

Keywords: Biological yield, Hemp, Malva mallow, Safflower, Water require irrigation

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The Effect of Different Weed-free and Weed-infested Periods on Growth Indices of Black Seed (*Nigella sativa* L.)

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Abstract

In order to investigate the effect of different weed-free and weed-infested periods on the growth indices of black seed, a field experiment was conducted at the Agricultural Research Station of Ferdowsi University of Mashhad, during 2009-2010 growing season. The experiment was laid out in randomized complete block design with 12 treatments and 3 replications. Twelve experimental treatments consist of six initial weed-free periods in which plots were kept free of weeds for 0 (WF 0), 14 (WF 14), 28 (WF 28), 42 (WF 42), 56 (WF56), 70 (WF 70) days after crop emergence (DAE), and then weeds were allowed to grow until harvesting, and six initial weed-infested periods in which weed allowed to grow for 0 (WI 0), 14 (WI 14), 28 (WI 28), 42 (WI 42), 56 (WI56), 70 (WI 70) DAE, then plots kept free of weeds to harvesting. The results indicated that black seed height was strongly affected by different weed free and weed-infested periods. Interestingly, weed interference for entire growing season caused increase in black seed height by 39% compared with the treatment that was weed free throughout the growing season. Also, these periods had significant effects on leaf area index, green area index, dry matter accumulation, crop growth rate and relative growth rate. Mentioned traits increased with increasing duration of weed- free periods and were reduced by increasing length of weed- infested periods. However, these periods had no significant effects on net assimilation rate, specific leaf area and specific leaf weight.

Keywords: Crop growth rate, Dry matter accumulation, Leaf area index, Weed competition

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Study the Effect of Intercropping of three Sesame Genotypes on Morphological and Physiological Indices

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Abstract

In order to study the effect of intercropping (mix cropping) of three sesame genotypes (Sabzevar, Kashmar and Kalat) a field experiment was conducted based on a Complete Randomized Block Design with three replications at Research Station, College of Agriculture Ferdowsi University of Mashhad, in year 2009. The experimental treatments were: sole cultivation of Sabzevar, Kalat, Kashmar genotypes, and their intercrops (Sabzevar with Kashmar, Sabzevar with Kalat, Kalat with Kashmar), respectively. The results showed that the highest grain yield was observed in Sabzevar-Kashmar (1029 kg/ha) and Sabzevar-Kalat (1016 kg) treatments, and the lowest was obtained in sole cultivation of Kalat (770/7 kg). Sabzevar-Kashmar treatment had the highest amount of other morphological parameters such as plant height, number of main nodes, biological yield and number of branches compared with other treatments. The highest growth rate (CGR) was observed in Sabzevar-Kashmar treatment, too. Sabzevar-Kashmar along with Kalat - Sabzevar treatments had the highest amounts of other morphological criteria such as leaf area index (LAI), net assimilation rate (NAR), relative growth rate (RGR); and sole cultivation of Kalat treatment had the lowest mentioned criteria. In the sole cultivation of different sesame genotypes, the highest grain yield and other growth characteristics were obtained in Sabzevar, Kashmar and Kalat genotypes, respectively.

Keywords: Inter cropping, Morphological and physiological indices

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Sowing Depth Effects on Vetch Yield in Maragheh Dry Lands

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Abstract

Increases forage production and economic production in rainfed condition requires attention to agricultural issues such as determination of appropriate sowing depth. So in order to determine the effect of different sowing depths of vetch this experiment was conducted in Agricultural Research Station of Maragheh as strip plot based on randomized complete block design with three species of vetch *V. sativa*, *V. dasycarpa-kouhak* and *V. narbonensis* velox67 as main plots and three sowing depth as sub factor. Results showed that the effect of sowing depth on *Vicia* yield was significant at the 1% level and the maximum yield of wet hay, dry hay, straw and seed depth of belong to 8-10 cm depth and respectively are 5.364, 3.416, 4.389 and 1.081 ton per ha whereas the minimum yield of wet hay, dry hay, straw and seed depth of belong to 2-4 cm depth and respectively are 4.888, 2.318, 3.729 and 0.825. Among the three *Vicia* species the highest yield of wet hay, dry hay, straw and seed belongs to *V. dasycarpa* and respectively are 5.632, 3.532, 4.614 and 1.065 ton/ha. Soil moisture study in the field of these vetches at the time of 10 % vetch flowering showed water differences. *V. dasycarpa* had lower water depletion from soil. The amount of average soil water for species included: *V. dasycarpa* 26.31, *V. sativa* 23.76 and *V. narbonensis* 22.5.

Keywords: Dry land, Gravity soil moisture, Sowing depth, Vetch

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The Reaction of Kochia (*Kochia scoparia*) Ecotypes to Sowing Date in Mashhad Weather Condition

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Abstract

Kochia is one of those plants which have capability to grow in different environments and can be used as a valuable plant to produce biomass and seed. The purpose of this study was to evaluate the possibility of Kochia planting in different dates as well as its resistance to cold weather of Mashhad winter. Seven sowing dates including 10th October, November, March, April, May, June and July and three Iranian kochia ecotypes including Birjand, Sabzevar and Borujerd were considered as main and sub plots, respectively, in a split plot design based on CRDB with three replications. Results showed that those planted on September and October died due to the cold weather of autumn and winter. Plant height, shoot yield and biological yield were decreased due to the delayed planting after March. Birjand ecotype produced the highest plant compared to the other ecotypes, but there was no significant difference among ecotypes according to shoot yield. Also, biological yield in Sabzevar ecotypes was significantly higher than other ecotypes. Seed yield at those planted on April was higher than other planting dates but there were no significant differences in seed yield among the other ecotypes. The highest and lowest harvest index obtained at those planted on June and March, respectively. Generally, results showed that kochia could not tolerate Mashhad winter condition but could be planted after March.

Keywords: Cold, Harvest index, Yield

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Effect of Zinc Element on Growth, Yield Components and some Physiological Characteristics of Maize under NaCl Salinity Stress

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Abstract

In order to investigate the effect of zinc element application on growth and some Morphophysiological of maize (single cross 704) an experiment was conducted during 2010 at greenhouse. Experimented design was complete randomize factorial with four replications. Treatments of experiment were soil salinity (4, 8 dS.m⁻¹ and 0 as a control) and different zinc concentration including 0, 10 and 20 mg.kg⁻¹. Results showed that salinity stress had significantly different effects on all measured parameters while effect on zinc concentration was not significant and resulted in significant reduction for all phonological and physiological traits of Maize while proline and sodium contents were increased. At non stress condition, application of zinc had no significant effect on ear length, number of grains in ear, 1000 grains weight, proline and sodium concentration comparing to control. Plant height, total dry weight, relative water content percent and zinc potassium concentration increasing at zinc treatments in non-salinity stress condition. Application of zinc at salinity stress treatment led to increasing zinc and potassium concentration of plants, improving growth and yield components of Maize and significant decrease in proline and sodium content of plants. Positive effect of zinc application on growth of Maize was clearer on stress condition than control.

Keywords: Maize, Salinity stress, Yield Components, Zinc element application

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Evaluation of Harvesting Dates on Qualitative Traits of Spring Safflower (*Carthamus tinctorius* L.) Genotypes under Urmia Condition

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Abstract

In order to evaluate the effects of harvesting dates on qualitative traits of safflower genotypes, an experiment was carried out under field conditions in the agricultural faculty of Urmia University in 2009-10. Factorial experiments were based on Randomized Complete Blocks design with four replications was used under field condition. Genotypes included Isfahan landrace, Sina, IL111 and PI250536 as first factor and harvesting dates of 106, 121 and 136 days after sowing as second factor. Results of analysis of variance showed that significant interactions between cultivars and harvest dates on grain yield, oil%, protein yield, grain harvest index, oil and protein harvest indices. Also, there was among harvest date significant 1% for trate protein% and protein harvest index. Isfahan landrace in second and third and PI250536 line at third harvesting date had the highest grain yield. Sina cultivar at the first harvesting dates was allocated the highest oil%. Also, in the third harvesting date Esfahan landrace and PI250536 line had the highest oil yield. In the third harvesting date Protein % and Protein harvest index were highest range.

Keywords: Grain yield, Harvest date, Oil percentage, Protein percentage,

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Evaluation of Accessions and Varieties of Chickpea (*Cicer arietinum* L.) Based on Agro-physiological Traits

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Abstract

In order to study of genetic variation and identification of yield components in chickpea, a trial consists of 96 accessions of chickpea received from Iranian gen bank (Seed and Plant Improvement Institute) along with five checks (Arman, Bivani, Jam, Hashem and ILC-482) was conducted based on an augmented design in 2005-06 cropping season at research farm of agricultural college, Razi University, Kermanshah, Iran. For evaluating of accessions the morphological, physiological and phenological traits during plant growth were measured. The result of ANOVA and mean comparisons showed significant differences among accessions for some of the traits i.e., days to first flower opening (DF-1), days to 50% flower opening (DF-50%), days to first pod opening (DP-1), days to 50% pod opening (DP-50%), days to maturity (DM), days to 90% maturity (DM90%), plant height (PH), height of first pod (PH-1P), number of pod per plant (NPPP), number of single seed per pod (1SP), number of double seed per pod (2 SP), and pod width (WP), number of seed per pod (NSPP) and 100 seed weight (100SW). Correlation coefficient analysis showed the grain yield significantly correlated with biomass ($r=0.84^{**}$), 1SP ($r=0.80^{**}$) and harvest index (HI, $r=0.44^{**}$). Stepwise regression analysis showed that the NPPP, number of seed per pod (NSPP), 100SW, biomass, HI, canopy width (CanW) and DP-1 positively affected on grain yield, while PH-1P and DF-1 negatively affected on grain yield.

Keywords: Regression analysis, Genetic variation, Agro-physiological traits, Chickpea

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Effects of Iron Nutrition on Yield and Agronomic Traits of Developed Iranian Spring Wheat Genotypes

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Abstract

In order to compare the agronomic characteristics of developed Iranian spring wheat genotypes (selective cultivars from: endemic landraces of wheat, interal hybrid wheat and international centers) and also the identifying traits affecting grain production under different *concentration* of *iron* in the *soil* solution, a randomized complete block design with a split-plot arrangement with 30 wheat genotypes and three replications was conducted during 2007-2008 at research farm of Rodasht, Isfahan. The results showed that among the endemic original wheat genotypes, grain yield with 17.2 and tiller number with 13.0 had the highest coefficient of variation (CV) under Fe deficiency condition. Grain yield varied from 3583 kg ha⁻¹ in Shole to 5361 kg ha⁻¹ in Sorkhtokhm genotype. Among the inside hybrid wheat genotypes, grain yield (17.0), straw yield (14.5) and tiller number (13.5) had the highest CV at the added Fe treatment. Difference between the highest (Ghods genotype) and the lowest (Chenab genotype) grain yield was 2440 kg ha⁻¹. Difference between the highest (Adl genotype) and the lowest (Maron genotype) straw yield was 5062 kg ha⁻¹. Among the inside hybrid spring wheat genotypes, there was positive correlation ($R^2=0.58^{**}$) between grain yield and plant height. Also, difference between the lowest (in Falat genotype) and the highest (in Dez genotype) straw yield was 35%. According to the results obtained from the present study, soil application of Fe fertilizer had no significant effect on yield and components yield of spring wheat genotypes, regardless of their origin while it significantly increased straw yield of wheat genotypes particularly inside hybrid genotypes.

Keywords: Endemic wheat, Grain yield, Interal hybrid wheat, Iron deficiency

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The Effect of Additive Maize-bean Intercropping on Yield, Yield Components and Weeds Control in Zanzan Climate Conditions

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Abstract

Increasing diversity and apply intercropping systems is one of approaches to control of weeds. To evaluate the effects of additive maize-bean intercropping on yield, yield components and weeds in Zanzan conditions, a field study was conducted in a spilt plot with randomized complete block design in three replications at Research Farm of Zanzan University in 2010. Main plots were the different patterns of additive intercropping systems in 6 levels included: sowing 20, 40, 60 and 80% of bean optimum density + 100% of maize optimum density and sole cropping of the crops and sub-plots were control and non-control of weeds. Density and biomass of weeds was sampled during growth season for comparing the amount of weeds control among different treatments. Yield and yield components of two crops were measured at the harvest time and advantage of intercropping was calculated by use of intercropping evaluation indices. The results showed that the most of weeds control was obtained in 80% bean+100% maize (reduction of 70% compared to sole cropping) and the highest and lowest yield of maize under non-control of weeds conditions were observed in 60% bean + 100% maize (7813 kg ha⁻¹) and sole cropping (6530 kg ha⁻¹) treatments, respectively. According to the all of indicators, intercropping had advantages compared to the monoculture of the crops. The intercropping of 80% bean + 100% maize had the highest advantage based on Land Equivalent Ratio (LER), Actual Yield Loss or Gain (AYL) and Intercropping Advantage (IA) but the highest advantage was obtained in the treatment of 60% bean + 100% maize by Relative Value Total (RVT) indicator and the intercropping of 40% bean + 100% maize showed the highest value as used of Relative Crowding Coefficient (RCC).

Keywords: Intercropping Evaluation Indicator, Land Equivalent Ratio, Intercropping Advantage, Relative Value Total

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Evaluation of Spring Rapeseed Cultivars Response To Spring And Autumn Planting Seasons

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Abstract

Sowing date is an important determinant of yield in canola. Cultivation of winter rapeseed cultivars in semi arid regions of Iran however it has high potential for production, but, mentioned cultivars are late maturity and this late maturity cause to that silique formation and seed filling periods mature in the same time with hot and dry weather condition. In contrast, spring rapeseed cultivars are shorter growth duration and in this regard, identification of spring rapeseed cultivars with high cold tolerance for autumn planting cause to early harvest. In order to investigation of spring rapeseed cultivars reaction to spring and autumn planting dates, an experimental was carried out in a split plot design based on RCBD with four replications for two years (2004-2006) in Karaj. Treatments were included planting season in two levels as main plots such as common planting date, autumn planting (27 September) and spring planting (25 March) and spring rapeseed varieties as sub plots in 24 levels. The results indicated that simple effects of planting season and variety and also interaction effect on silique per plant, seed per silique, 1000 seed weight, seed yield, oil yield, biologic yield and harvest index were significant at 1% level probability. In autumn planting, Hyola 401 with greatest 1000 seed weight and high seed per silique had the highest seed yield (4689 kg.ha^{-1}) and Hyola 330 produced the maximum oil yield (2165 kg.ha^{-1}), whereas RG 405/03 had the maximum seed yield and oil yield (2066 and 713.6 kg.ha^{-1} , respectively) in spring planting. On the basis of this result, some of spring rapeseed cultivars with high cold tolerance and high potential such as Hyola 401 could be planting in early autumn at moderate cold regions of Iran like Karaj.

Keywords: Harvest Index, Oil yield, Planting season, Rapeseed, Seed yield and its Components

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The Effect of Plant Density on Extinction Coefficient and Radiation Use Efficiency in Modern and Old Wheat (*Triticum aestivum* L.) Genotypes

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Abstract

To achieve optimal yield and high production in wheat, need to adapt the plant's vegetative and reproductive growth stages to environmental conditions and increase use efficiency of production factors by desirable density. in order to study the effect of plant density on Extinction Coefficient and Radiation Use in Modern and old Wheat (*Triticum aestivum* L.) genotypes, an experiment was conducted on the agricultural research farm located in Gorgan city using three density levels (150, 262 and 375 plant per meter square) and three Wheat- genotypes (Falat, Tajan, N-81-18) during 2007-2008. The experiment was conducted with factorial arrangement based on randomized complete block design, with 4 replications. Results showed that the highest amount of LAI and DM was obtained in N-81-18 line and 375 plant in meter square, also plant density and genotype was not effect on the Extinction Coefficient, but just plant density effects on Radiation Use Efficiency. in such a way that the highest amount of Radiation Use Efficiency is for N-81-18 line in 375 plant in meter square.

Keywords: Cultivars, density, Radiation Extinction Coefficient, Radiation Use Efficiency, Wheat

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Effectiveness of Stability Indices for Bread Wheat Genotypes Selection to Water Deficit Tolerant

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Abstract

In countries such as Iran which will be faced water deficit as the main challenge in the future and the food production is going to be dependent to water recourses, wheat water-deficit tolerant and adapted genotypes release is one of the most important strategies under such a condition. In order to study the adaptation and terminal water deficit stress tolerance, fifteen bread wheat lines and Chamran cultivar as the check were evaluated. This research was carried out at Ahvaz, Dezfool, Zabol and Darab, south warm region research stations, in 2007-08 and 2008-09, in two separated experiments (1-well-watered and 2- terminal water deficit stress), using complete randomized block design with three replications. Data were analyzed and genotypes response was evaluated based on tolerance indices. Results showed that the difference among stations, years, genotypes and double and triple effects of source variations were significant at 1% probability level. Mean grain yield was 4300 Kg/ha in first year, while grain yield increased significantly in second year and reached to 5692 Kg/ha. Mean grain yield were 5840 and 4591Kg/ha under well-watered and terminal water deficit stress conditions, respectively. Correlation coefficients among STI, GMP, MP and K_1 STI were significant. Correlation coefficient between slop of linear regression of grain yield in response to drought stress intensity and grain yield under terminal water deficit stress was positively and, with K_2 STI, TOL and SSI was negatively significant. Grain yield index, (YIR) the proportion of grain yield of each genotype to grand mean of grain yield of all genotypes was the most important components to define grain yield in stepwise regression under both experiment conditions. According to the results of this research and based on tolerance indices, lines No. 2, 14 and 15 were selected as the high potential- terminal water deficit stress tolerant genotypes.

Keywords: Advance lines, Adaptation, Stress intensity

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Investigating The Effect of Inter- and Intra-row Spacing on Dry Matter Accumulation and Partitioning in Faba bean

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Abstract

This study was conducted to evaluate the effects of different inter- and intra-row spacing on the dry matter accumulation and partitioning coefficients in faba bean, Barakat cultivar. Experiment was conducted as factorial in a randomized complete block design with three replications. Factors were inter-row spacing (15, 30, 45 and 60 cm) and intra-row spacing (5, 10 and 15 cm). The plant dry matter accumulation and partitioning was measured during growing season for stem, leaf, and pod, separately. The results showed that the dry matter accumulation in leaves and stems was as a linear function during emergence until pod set stage. In this period, partitioning coefficients to leaves and stems were 0.26-0.41 and 0.58-0.73, respectively. Dry matter partitioning coefficient for leaves was 49-61 percent in early growing season that decreased to 28-37 percent in pod set stage. The coefficients of partitioning dry matter to stems in these two periods of growing season were 38-49 and 56-71 percent, respectively. These results indicate that the dry matter partitioning to leaves decreases and to stems increases as crop develops in faba bean.

Keywords: Dry matter partitioning coefficients, Faba bean, Inter- and intra-row spacing

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