



Collage: Agriculture	Department: Vegetable & Flori Department	Call No:
Author: Mahmoud Mohamed Helmy Mohamed	Degree: M. Sc	Date: 3/12/2008

Title: WATER REQUIERMENT OF SOME PEA CULTIVARS PLANTED AT DIFFERENT SOWING DATES UNDER DRIP IRRIGATION SYSTEM

Dissertation Abstract

Two field experiments were carried out during the two seasons of 2005-2006 and 2006-2007 at El-Kassasien Horticulture Research Station, Ismailia Governorate to study the effect of different drip irrigation rates, sowing dates, cultivars and their interaction on growth, photosynthetic pigments, seed chemical constituents, water relationship, yield and its components and water use efficiency. The present investigation included 18 treatments, which were the combination of three drip irrigation rates (800, 1000 and 1200 m³ water / fed.), three sowing dates (20th Sep., 10th Oct. and 1st Nov.) and two pea cultivars (Victory freezer and Lincoln). The most important results could be summarized as follows: 1. Vegetative characters 1- The best treatment gave maximum values of plant height, number of branches per plant and number of leaves per plant was 1200 m³ water / fed. 2- The most favorable sowing date for increasing plant height, number of branches per plant and number of leaves per plant was 10th Oct. 3- The highest values of plant height were recorded with cultivar victory freezer while number of leaves per plant and number of branches per plant were not significantly affected. 4- The highest values of number of branches and leaves per plant were recorded when pea plants were sown on 10th Oct. and irrigated with 1200 m³ / fed. 5- The highest values of plant height were recorded when victory freezer plants were irrigated with 1200 m³ / fed., while the highest values of number of branches and leaves per plant were recorded when Lincoln plants were irrigated with 1200 m³ / fed. 6- The highest values of number of branches and plant height were recorded when Victory freezer plants were sown on 10th Oct., while the highest values of number of leaves per plant were recorded when Lincoln plants were sown on 10th Oct. 7- The triple interaction among drip irrigation rates, sowing dates and cultivars did not reflect any significant effect on vegetative characters. 2. Dry weight 1- Application of 1200 m³ water / fed. being the most effective treatments and recorded the greatest increments of branches and leaves dry weight. 2 Sowing pea on 10th Oct. recorded the greatest increments of branches and leaves dry weight. 3- The highest values of dry weight of branches and leaves were recorded with cv. Victory freezer. 4- The interaction between drip irrigation rates and sowing dates had a significant effect on dry weights of branches and leaves, where the highest values of dry weights of branches and leaves were recorded, when pea plants were sown on 10th Oct. and irrigated with 1200 m³ / fed. 5- The interaction between drip irrigation rates and cultivars, sowing dates and cultivars and triple interaction did not exert significant effect on dry weights of branches and leaves. 3. Photosynthetic pigments 1- Leaf pigment contents, i.e., chlorophyll a, b and total chlorophyll (a + b) were significantly increased with reducing water quantity up to the lowest level (800 m³ / fed). 2- The best sowing date that gave the highest values of photosynthetic pigments (chlorophyll a, b, total chlorophyll a + b and carotenoids) in leaf tissues was 10th Oct. 3- Leaf pigment contents were significantly affected with cultivars. Victory freezer Cultivar recorded the highest value. 4- The interaction effect between drip irrigation rates and sowing dates on leaf pigment contents exerted significant effect. The highest value was recorded with sowing pea plants on 10th Oct. and irrigation with 800 m³ / fed. 5- Leaf pigment contents were significantly affected by the interaction between drip irrigation rates and cultivars, where the highest value was recorded when cv. Victory freezer was irrigated with 800 m³ / fed. 6- Leaf pigment contents were not significantly affected by the interaction between sowing dates and cultivars except total chlorophyll and carotenoids, where the highest value was recorded with sowing cv. Victory freezer Plants on 10th Oct. 7- Leaf pigment contents were not significantly affected by the interaction among drip irrigation rates, sowing dates and cultivars except total chlorophyll and carotenoids, where the highest values were recorded with sowing cv. Victory freezer on 10th Oct. and irrigation with 800 m³ / fed. 4. Plant chemical composition 4.1. Leaves chemical composition 1- The content of N%, P% and K% was significantly increased with increasing the applied water up to 1200m³ / fed. On the other hand, proline was significantly increased with the lowest amount of water (800m³ / fed.). 2- Leaf chemical constituents were significantly affected by sowing dates, where sowing pea on 10th Oct. gave the highest values of N%, P% and K%, while sowing pea on 20th Sep. gave the highest proline value. 3- No significant effects were detected between the two cultivars on Leaf chemical constituents. 4- The interaction between drip irrigation rates and sowing date exerted significant effect on leaf chemical compositions, where the highest values of N%, P% and K% was obtained when sowing pea plants on 10th Oct. and application of 1200 m³ / fed, while the highest values of proline was obtained with sowing pea plants on 20th Sep. and application of 800 m³ / fed. 5- Proline was significantly affected with interaction between drip irrigation rates and cultivar, while N%, P% and K% were not significant effect by interaction between drip irrigation rates and cultivar. Both cultivars and application of 800 m³ / fed. gave the highest values of proline. 6- The interaction between sowing dates and cultivars and triple interaction did not exert significant effect on leaf chemical compositions except N%, where sowing cv. Victory freezer on 10th Oct. gave the highest N% value. 4.2. Seeds chemical composition 1- Seed chemical compositions were significantly affected by applied irrigation water. Application of 1200 m³ water / fed. being the most effective treatments recorded the highest values of N%, P%, K%, protein and total carbohydrate of pea seeds, while application of 800 m³ water / fed. gave the highest value of total soluble sugar of pea seeds. 2- Seed chemical compositions were significantly affected by sowing dates. Sowing pea plant on 10th Oct. gave the highest value of N%, P%, K% and protein, while sowing pea plant on 20th Sep. gave the highest value of total carbohydrate. While sowing pea plant on 1st Nov. gave the highest value of total soluble sugar. 3- There were significant differences between the two cultivars with respect to total soluble sugar while N%, P%, K%, protein and total carbohydrate were not significantly affected. Victory freezer cultivar gave the highest value of total soluble sugar. 4- Concerning the effect of interaction between drip irrigation rates and sowing dates there were significant effect on seed chemical compositions, i.e., N%, K%, protein and total soluble sugar, while p% and total carbohydrate were not significantly affected. The highest values of N%, K% and protein were obtained with sowing pea on 10th Oct. and application of 1200 m³ / fed., while the highest values of total soluble sugar was obtained with sowing pea on 1st Nov. and application of 800 m³ / fed. 5- The interaction between drip irrigation rates and cultivars, sowing dates and cultivars and triple interaction did not exerted significant effect on seeds chemical composition except P%, where the highest values of P% was obtained with sowing Victory freezer on 10th Oct. 5- Water relationships 1- Concerning drip irrigation rates there were significant effects on free water, bound water and total water of pea leaf tissues, where the maximum values of free water and total water were recorded with highest water quantity 1200 m³ / fed., while the maximum values of bound water were recorded with lowest water quantity 800 m³ / fed. 2- The maximum values of free and total water were recorded with later sowing date 1st Nov. while the early sowing 20th Sep. gave the maximum value of bound water. 3- Cultivars did not significantly affect free, bound and total water of pea leaf tissues 4- As respect to the interaction between drip irrigation rates and sowing dates the maximum values of free and total water were recorded with application of 1200 m³ / fed. and both two later sown (10th Oct. and 1st Nov.), while the maximum values of bound water were recorded with application of 800 m³ / fed. and early sown 20th Sep. 5- The interaction between drip irrigation rates and cultivars, sowing dates and cultivars and triple interaction did not exert significant effect on water relationships. 6. Yield and its components 1- Increasing the amount of applied irrigation water up to the highest level, i.e., 1200 m³ water / fed. increased pod length, netting%, green pod yield per plant and green pod yield per fed. 2- The greatest average weight of 100 seeds were recorded with 10th Oct. or 1st Nov. while 10th Oct. recorded the maximum values of netting%, green pod yield per plant and green pod yield per fed. 3- Victory freezer recorded highest values of number of seeds per pod, green pod yield per plant and green pod yield per fed., while Lincoln recorded the heaviest weight of 100 seeds. 4- The best interaction treatment for increasing Pod diameter and weight of 100 seeds were application of 1200 m³ / fed. and sowing pea plant on 10th Oct. 5- Interaction between drip irrigation rates and cultivars had no significant effects on yield and its components except Pod length. Lincoln cultivar and 1000 m³ water / fed. in the first season recorded highest value. 6- Interaction between sowing dates and cultivars had significant effects on Pod length and pod diameter. The highest values of pod length were recorded from cultivar Lincoln which sown on 1st Nov. while the highest values of pod diameter recorded from cultivar Victory freezer which sown on 10th Oct. 7- The interaction among drip irrigation rates, sowing dates and cultivars had no significant effects on yield and its components of pea plants except pod length on the first season. The highest value of pod length was recorded with cultivar Lincoln which sown on 10th Oct. or 1st Nov. and irrigated with 1000 m³ / fed. 7- Water use efficiency 1- The maximum value of water economy was recorded with lowest water quantity 800 m³ / fed. 2- The maximum value of water economy was recorded with medium sowing 10th Oct. 3- Victory freezer cultivar. gave the higher values of water economy 4- The maximum values of water economy were recorded with application of 800 m³ / fed. and sowing on 1st Nov. 5- Concerning the other interactions no significant differences were detected

Keywords: Pea - Water requirement - Sowing dates - Cultivars

CONTENTS

	Page
I.INTRODUCTION	1
II.RIEW Of LITERATURE	3
III.TERIALS AND METHODS	33
IV.RESULTS AND DISCUSSION	39
4.1. Plant growth	39
4.1.1.Effect of drip irrigation rates	39
4.1.2.Effect of sowing dates	40
4.1.3.Effect of cultivars	41
4.1.4.Effect of interactions	41
4.2.Dry weight	48
4.2.1.Effect of drip irrigation rates	48
4.2.2.Effect of sowing dates	49
4.2.3.Effect of cultivars	51
4 .2.4.Effect of interactions	51
4.3. Photosynthetic pigments.	57
4.3.1.Effect of drip irrigation rates	57
4.3.2. Effect of sowing dates	58
4.3.3.Effect of cultivars	58
4.3 4.Effect of interactions	58
4.4. Plant chemical composition	65
4.4.1.Laves chemical constituents	65
4.4.1.1. Effect of drip irrigation rates	65
4.4.1.2. Effect of sowing dates	65
4.4.1.3. Effect of cultivars	67
4.4.1.4. Effect of interactions	67

4.4.2.Seed chemical constituents	72
4.4.2.1. Effect of drip irrigation rates	72
4.4.2.2. Effect of sowing dates	73
4.4.2.3. Effect of cultivars	73
4.4.2.4. Effect of interactions	75
4.5. Water relationships.	80
4.5.1. Effect of drip irrigation rates	80
4.5.2. Effect of sowing dates	80
4.5.3. Effect of cultivars	80
4.5.4. Effect of interactions	82
4. 6. Yield and its components	87
4.6.1. Effect of drip irrigation rates	87
4.6.2. Effect of sowing dates	88
4.6.3. Effect of cultivars	89
4.6.4. Effect of interactions	89
4.7 Water use efficiency	101
4.7.1. Effect of drip irrigation rates	101
4.7.2. Effect of sowing dates	101
4.7.3. Effect of cultivars	101
4.7.4. Effect of interactions	102
V.SUMMARY AND CONCLUSION	105
VI.LITERATURE CITED	112
ARABIC SUMMARY	1-6