

THE EFFECT OF PLANTING DENSITY ON GROWTH ATTRIBUTES AND MAJOR PESTS OF VIOLET ONION *Allium ascalonicum* (L.) IN VINH CHAU

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ABSTRACT

The field experiment was conducted from November 2009 to January 2010 at the farmers' fields in Vinh Hai commune, Vinh Chau district, Soc Trang province, Vietnam to evaluate the effect of row and plant distance on the violet onion's growth attributes, the diversity of the harmful insects, the diseases and yields of violet onion under Vinh Chau condition. The Tu Coong violet onion variety was grown with row and plant distance of 15x10 cm, 15x12 cm, 15x15 cm, 15x18 cm, 15x20 cm and 20x20 cm as different treatments and each was replicated three times in Randomized Complete Block Design (RCBD). The results indicated that violet onions grown with the row and plant distance of 15x15 cm offered the highest economic efficiency due to lower input cost by reducing number of seeds (0.15 ton/ha), less diseases and pests, the yields increased concurrently (0.54 ton/ha).

Keywords: violet onion, planting density, major pest, Vinh Chau.

INTRODUCTION

Onion (*Allium cepa* L.) is one of the most important vegetables of the various aspects of economy, food and health (Anonymous, 2009).

In Vietnam, violet onion (*Allium ascalonicum* L.) is considered as one of the specialties of Soc Trang province. It has the high economic value and plays an important role in the plant structure of Vinh Chau district. Vinh Chau has good conditions to grow vegetables throughout the year together with huge sand dunes found in coastal region, where violet onion is considered as traditional vegetables and the main source of income for the Khmer people. Soc Trang is the largest cultivation area of violet onion in Mekong Delta with approximately 4,500 hectares, of which Vinh Chau district accounts for over 4,000 ha. Every year, it provides the total output from 60,000 to 80,000 tons to Ho Chi Minh City and the Mekong Delta provinces. However, the violet onion production of Soc Trang province is still not enough to meet domestic demand and export (Quach Nhi, 2009). Recent years, the yield and quality of violet onion in Vinh Chau start declining as well as being

difficult to preserve and postharvest storage. The main reason is the expansion of areas with intensive farming, especially in view of farmers' common misuse or overuse of fertilizers and chemicals. As a result, the pests on violet onion plants have increased. Some pests, such as specific turbidity *Delia platura*, oriental leafworm moth *Spodoptera litura* (Fab.), beet army worm *Spodoptera exigua*, duct rot bacterium *Erwinia* sp., ringspot, *Alternaria* sp. and anthracnose *Colletotrichum* sp. have been increasing. They damage seriously on the yield and quality of onion



(Cuc, 2007).

Today, Vietnam integrated into the World

Trade Organization (WTO). The farmers have to produce the clean and safe production so that the Vinh Chau violet onion will be exported more and more. Aminpor and Mortazavibak (2004) examined the effects of row and plant distance on yield of onion seed in Texas. They reported that the treatments with distance of plants on row 10 and 30 cm obtain the highest yield compared with the plant spacing of 20 cm. Because of the affect of planting density on onion's yield, the proper row and plant distance for growing of violet onion can improve its yield (Vishunu *et al.*, 1989). Study was conducted on the effect of planting density to the violet onion yield and the main pests of violet onion in Vinh Chau to find out a suitable row and plant distance for growing of violet onion, and base on which

to build the process of integrated management of violet onion pests.

MATERIALS AND METHODS

The experiment was started from November 2009 to January 2010 in Vinh Hai commune, Vinh Chau district, Soc Trang province. The violet onion variety was Tu Coong. The violet onion seed was selected to be free of insect pests and disease and had the same size (50-56 gram/seed).

The treatments were assigned as row and plant distance of 15x10 cm, 15x12 cm, 15x15 cm, 15x18 cm, 15x20 cm and 20x20 cm and each treatment was replicated three times in randomized complete block design (RCBD). Each plot size was 40 m².

R1	R2	R3
T1: 15x10 cm	T5: 15x20 cm	T4: 15x18 cm
T3: 15x15 cm	T2: 15x12 cm	T3: 15x15 cm
T5: 15x20 cm	T4: 15x18 cm	T1: 15x10 cm
T6: 20x20 cm	T3: 15x15 cm	T2: 15x12 cm
T2: 15x12 cm	T1: 15x10 cm	T6: 20x20 cm
T4: 15x18 cm	T6: 20x20 cm	T5: 15x20 cm

Layout of the experiments

The same application of fertilizer, weeding, irrigation and other controls for all treatments. The onion's growth attributes including the mortality (if any) of the harmful insects and symptom of disease on violet onion was recorded at 7, 14, 21, 28, 35, 42 and 49 days after seeding. The input and the yield of violet onion in each plot were also recorded for economic analysis. The data collected from various experiments were subjected to statistical analysis by SPSS software version 13

RESULTS AND DISCUSSION

The experiments of violet onions grown with the row and plant distance of 15x10cm, 15x12cm, 15x15cm and 15x18cm had higher number of buds /m² than those of 20x15cm

and 20x20cm through all observations. This indicates that the number of buds/m² depended on plant and row distance. However, the number of buds/m² in the first for treatment were not statistically significant difference compared to that of the farmers' growing practice (15x12cm) excepted the last treatment (T6).

The data in table 2 show that there were no statistically significant difference in the number of leaves/m² in almost all observations for all three of treatments of 15x10 cm, 15x15 cm and 15x18 cm distance compared with common distance (15 x 12 cm) that practiced by farmer (farmer method). However, two treatments of 15x20 cm and 20x20 cm distance had lower number of leaves/m² compared with farmer method

Table 1. The effect of density on number of buds of violet onion grown at Vinh Chau (Nov 2009 – Jan 2010)

Treatment		Number of buds/m ²						
		7DAS	14DAS	21DAS	28DAS	35DAS	42DAS	49DAS
T1	(15x10) cm	178.3 a	201.0 ab	215.0 b	226.3 bc	238.7 bc	243.0 bc	252.3 ab
T2	(15x12) cm	162.7 a	184.7 b	235.0 a	262.0 a	280.7 a	288.0 a	290.3 a
T3	(15x15) cm	169.3 a	190.7 ab	229.7 ab	247.0 ab	257.7 ab	262.7 ab	263.0 ab
T4	(15x18) cm	164.0 a	208.0 a	234.0 a	253.7 ab	260.3 ab	263.3 ab	253.3 ab
T5	(15x20) cm	128.0 b	156.3 c	196.0 c	207.7 c	216.0 c	223.0 c	231.0 b
T6	(20x20) cm	101.7 c	124.0 d	142.3 d	158.3 d	167.0 d	177.3 d	189.0 c
CV (%)		8.4	7.1	4.8	7.2	7.9	8.8	8.6

Means followed by the same letter(s) are not significantly different at 5% level based on DMRT; DAS: days after seeding; T2 is the growing interval by farmers practice at Vinh Chau.

Table 2. The effect of growing density on number of leaves of violet onion grown at Vinh Chau (Nov 2009 – Jan 2010)

Treatment		Number of leaves/m ²						
		7DAS	14DAS	21DAS	28DAS	35DAS	42DAS	49DAS
T1	(15x10) cm	608.3 a	680.7 a	753.7 a	848.3 ab	885.0 a	979.3 b	1595.7 a
T2	(15x12) cm	444.0 b	604.3 ab	765.7 a	869.3 a	875.0 a	963.0 b	1609.0 a
T3	(15x15) cm	500.0 b	601.3 ab	738.0 a	835.3 ab	888.0 a	1229.0 a	1522.3 a
T4	(15x18) cm	462.7 b	648.3 ab	790.7 a	878.3 a	913.0 a	966.3 b	1414.0 a
T5	(15x20) cm	361.0 c	483.0 bc	648.7 b	735.3 b	743.0 b	962.3 b	1475.3 a
T6	(20x20) cm	291.3 d	391.3 c	467.7 c	534.0 c	561.7 c	755.7 c	1063.0 b
CV (%)		7.6	16.3	4.4	8.0	8.0	9.4	9.4

Means followed by the same letter(s) are not significantly different at 5% level based on DMRT; DAS: days after seeding; T2 is the growing interval by farmers practice at Vinh Chau.

The results in table 3 indicate that thick planting of the onion led to more number of beet army worms *S. exigua* was. The numbers of *S. exigua* (heads/m²) in treatment of 15x10 cm distance was higher than those of the remaining treatments.

Table 3. The effect of growing density on numbers of army worms on violet onion grown at Vinh Chau (Nov 2009 – Jan 2010)

Treatment		Number of beet army worms, <i>S. exigua</i> (heads/m ²)						
		7DAS	14DAS	21DAS	28DAS	35DAS	42DAS	49DAS
T1	(15x10) cm	0.0	0.0	14.7 a	23.7 a	30.0 a	28.7 a	24.3 a
T2	(15x12) cm	0.0	0.0	12.7 ab	21.0 ab	22.0 b	15.7 b	11.0 b
T3	(15x15) cm	0.0	0.0	10.3 abc	16.0 bc	19.0 bc	16.7 b	11.3 b
T4	(15x18) cm	0.0	0.0	7.3 bc	13.7 cd	14.0 cd	10.0 bc	10.0 b
T5	(15x20) cm	0.0	0.0	6.7 c	13.3 cd	9.7 d	8.3 c	7.0 b
T6	(20x20) cm	0.0	0.0	5.0 c	9.3 d	11.7 d	10.0 bc	8.0 b
CV (%)		-	-	34.0	17.5	18.4	26.0	39.6

Means followed by the same letter(s) are not significantly different at 5% level based on DMRT; DAS: days after seeding; T2 is the growing interval by farmers practice at Vinh Chau.

The result on density trials in table 4 show that if grown at the row and plant distance of 15x10 cm, the percentage of mosaic, *Alternaria* sp. was higher than grown in the sparse interval trials. In our result, we found that if violet onion is grown too thickly, this will increase *Alternaria* sp., a major plant pathogen which causes damages to the violet onion.

Table 4. The effect of growing density on percentage of mosaic, *Alternaria* sp. on violet onions grown at Vinh Chau (Nov 2009 – Jan 2010)

Treatment		Mosaic Percentage, <i>Alternaria</i> sp. (%)						
		7DAS	14DAS	21DAS	28DAS	35DAS	42DAS	49DAS
T1	(10x15) cm	0.0	0.0	0.0	0.0	4.1 a	5.6 a	6.3 a
T2	(12x15) cm	0.0	0.0	0.0	0.0	2.2 ab	3.2 b	3.0 bc
T3	(15x15) cm	0.0	0.0	0.0	0.0	2.0 b	3.1 b	3.7 b
T4	(18x15) cm	0.0	0.0	0.0	0.0	0.8 b	1.9 b	2.3 c
T5	(20x15) cm	0.0	0.0	0.0	0.0	1.2 b	1.8 b	2.6 bc
T6	(20x20) cm	0.0	0.0	0.0	0.0	1.2 b	1.9 b	2.5 c
CV(%)		-	-	-	-	56.2	32.5	18.5

Means followed by a common letter are not significantly different at 5% level based on DMRT; DAS: days after seeding; T2 is the growing interval by farmers practice at Vinh Chau.

The violet onions grown with the row and plant distance of 15x15 cm gave higher statistical meaning yield in comparison with plant distance of 15x18 cm, 15x20 cm, 20x20 cm and 15x10 cm. Compared to the growing practice of farmers (15x12cm), the trial of 15x15 cm offered higher yield but had no significant difference compared with others. The interval trial of 15x15cm reduced number of seed (0.15 ton/ha) and increased yield (0.54

ton/ha) compared to the growing practice that farmers in Vinh Chau often apply (15x12cm). Number of seeds per hectare were less in treatment T4 (18x15cm), T5 (20x15cm) and T6 (20x20cm). They also showed lower yields than other treatments. In trial T1 (10x15cm), the number of seeds per hectare were higher, but the yield decreased in comparison with trial T2 (12x15cm).

Table 5. The effect of growing density on number of seeds and yield of violet onion grown at Vinh Chau

Treatment	Number of seed (kg/ha)	Seed variance comparing with T2(12x15cm) (kg/ha)	Yield (ton/ha)	Yield variance comparing with T2(12x15cm) (kg/ha)
T1 (10x15) cm	903.8	+ 150.8	13.1 bcd	- 1.420
T2 (12x15) cm	753.0	0.0	14.5 ab	0.000
T3 (15x15) cm	603.0	- 150.0	15.0 a	+ 0.540

3	15) cm	0			
T4	(18x15) cm	502.5	- 250.5	13.2 bc	- 1.30
T5	(20x15) cm	452.3	- 300.7	12.7 cd	- 1.830
T6	(20x20) cm	301.5	- 451.5	11.6 d	- 2.880
CV (%)				6.5	

Remark: T2 is the interval between plants grown by Vinh Chau farmers' practice

+ Increase as comparing with T2; - decrease as comparing with T2

The above results indicate that violet onions at Vinh Chau grown with the row and plant distance of 15x15 cm will offer the highest economic efficiency as it helps to reduce input for seeds, less diseases and pests, hence the yields will be increased.

CONCLUSION & SUGGESTION

The proper row and plant distance for growing violet onion in Vinh Chau area is 15x15 cm. It will help to reduce cost for seeds, reduce pests and diseases and increase growing ability of the crops as well as increase yield. From our findings, we strongly recommend that the row distance of 15X15 cm should be used to improve the yield and profitability of violet onion production in Vinh Chau – Soc Trang.

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NGHIÊN CỨU ẢNH HƯỞNG CỦA MẬT ĐỘ TRỒNG TỚI CÁC ĐẶC TÍNH SINH TRƯỞNG VÀ SÂU BỆNH HẠI CHÍNH CỦA HÀNH TÍM TẠI VĨNH CHÂU

Thí nghiệm “Nghiên cứu ảnh hưởng của mật độ trồng tới các đặc tính sinh trưởng và sâu bệnh hại chính của hành tím tại Vĩnh Châu” được thực hiện từ tháng 11 năm 2009 đến tháng 1 năm 2010 trên ruộng của nông dân ở xã Vĩnh Hải, huyện Vĩnh Châu, tỉnh Sóc Trăng nhằm đánh giá ảnh hưởng của khoảng cách trồng (hàng cách hàng, cây cách cây) đến sự sinh trưởng của cây hành, mật số sâu hại, tỷ lệ bệnh hại và năng suất hành tím. Giống hành tím Tù Coóng được trồng với 6 khoảng cách trồng khác nhau như sau: 15x10 cm, 15x12 cm, 15x15 cm, 15x18 cm, 15x20 cm and 20x20 cm. Mỗi khoảng cách trồng được xem là một nghiệm thức. Các nghiệm thức được bố trí theo kiểu khối hoàn toàn ngẫu nhiên với 3 lần nhắc lại. Kết quả thí nghiệm cho thấy trồng hành tím tại Vĩnh Châu với khoảng cách trồng 15x15 cm (hàng cách hàng 15 cm, cây cách cây 15 cm) cho hiệu quả kinh tế nhất vì giảm được chi phí giống (0,15 tấn củ giống/ha), ít sâu hại và bệnh hại đồng thời tăng năng suất (0,54 tấn/ha) so với khoảng cách trồng truyền thống của nông dân Vĩnh Châu.