NOVATEUR PUBLICATIONS
JournalNX- A Multidisciplinary Peer Reviewed Journal
ISSN No: 2581 - 4230
VOLUME 4, ISSUE 5, May -2018

STUDY OF THE ECONOMICS OF ONION PRODUCTION UNDER DRIP FERTIGATION

P.A. Gawande
Assistant Professor, Department of Agricultural Engineering, Dr. PDKV, Akola, Maharashtra.

N.S. Jamkar
Post Graduate Student, Department of Irrigation and Drainage Engineering, Dr. PDKV, Akola, Maharashtra.

A.N. Mankar
Assistant Professor, Department of Agricultural Engineering, Dr. PDKV, Akola, Maharashtra.

ABSTRACT:

The field experiment to study the "Effect of spacing and fertilizer levels on onion production under drip fertigation" was conducted at Chilli and Vegetable Research Unit, CRS, Dr. PDKV, Akola, during *Rabi* season of 2017-18, which comes under Western Vidarbha Region of Maharashtra. The experiment, comprising of 9 treatment combinations replicated three times, laid out in factorial randomize block design with three spacing 10 x 7.5 cm, 10 x 10 cm, and 10 x 12.5 cm and three fertilizer levels (80%, 100% and 120% recommended dose of NPK). Plant spacing 10 x 12.5 cm

The maximum net return with higher B:C ratio (2.74) was obtained in treatment combination F_3S_1 (10 x 7.5 cm spacing with 120% RDF). Because of maximizing the yield with closer spacing, application of maximum dose of fertilizer and considering the B:C ratio, the treatment combination F_3S_1 was best and can be recommended for maximum onion production in Western Vidarbha region.

Keywords: Crop geometry, fertilizer levels, B:C ratio, drip fertigation

INTRODUCTION:

Water is the most important and critical input in human life especially in agriculture and has made a significant contribution in providing stability to food grain production and self-sufficiency. The pressure for the most efficient use of water for agriculture is intensifying with the increased competition for water resources among various sectors with mushrooming population (Fanish, 2013). Globally 3790 km^3 of fresh water is annually used whereas 69 per cent of this fresh water use for agriculture. India is vast country with extremes of climate. India is the second largest producer of onion in the world, next only to China. In India, onion is being grown in an area of 1.05 million hectares with production of 16.81 million tonnes and the productivity is low 14.85 t ha^{-1} (Kamble and Kathmale, 2015). In India, only Maharashtra is the leading onion producing state followed by Madhya Pradesh, Karnataka, Gujarat, Rajasthan, Bihar etc. The geographical area of Maharashtra is 30.77 Mha and area under irrigation is only 3.65 Mha, which is 16.42 per cent of total cultivated area. (Kadam,2012). The area, production and productivity of onion in Maharashtra were 522.35 thousand hectare, 6529.34 thousand M tonnes and 12.50 tonnes per hectare, respectively, during the year 2015-16. (Anonymous, 2015) Fertigation refers to the

application of dissolved fertilizer to crop through an irrigation system. Application of small amounts of soluble fertilizer through drip irrigation saves labours, reduces compaction of the field, thereby, enhances productivity (Jat *et al*., 2011).

MATERIAL AND METHODS:

The field experiment was conducted to study the "Effect of spacing and fertilizer levels on onion production under drip fertigation", at Chilli and Vegetable Research Unit, Cotton Research Station, Dr. PDKV, Akola, during *Rabi* season of 2017-18, which comes under Western Vidarbha region of Maharashtra as per following treatment combination table 1..

Table 1. Treatment Combination

Treatment Combination	Specification
F_1S_1	80% Recommended Dose of Fertilizer + 10 cm × 7.5 cm spacing
F_1S_2	80% Recommended Dose of Fertilizer + 10 cm × 10 cm spacing
F_1S_3	80% Recommended Dose of Fertilizer +10 cm × 12.5 cm spacing
F_2S_1	100% Recommended Dose of Fertilizer + 10 cm × 7.5 cm spacing
F_2S_2	100% Recommended Dose of Fertilizer + 10 cm × 10 cm spacing
F_2S_3	100% Recommended Dose of Fertilizer + 10 cm × 12.5 cm spacing
F_3S_1	120% Recommended Dose of Fertilizer + 10cm × 7.5 cm spacing
F_3S_2	120% Recommended Dose of Fertilizer + 10 cm × 10 cm spacing
F_3S_3	120% Recommended Dose of Fertilizer + 10 cm × 12.5 cm spacing

Drip system was scheduled on alternate day interval throughout the season. The water requirement of onion under drip irrigation at 100 % ET was worked out on the basis of pan evaporation.

The cost of cultivation of each treatment was calculated per hectare on the basis of prevailing rates of labours, fertilizers, organic manures, irrigation and other expenditure. The total income per hectare was calculated as per the average wholesale price of onion in the local market. The net profit per hectare was calculated by deducting the cost of cultivation from the total income. The cost benefit ratio is calculated accordingly.

Cost economics of all treatments was worked out to compare the net returns and benefit cost ratio. Fixed cost, operating cost, net return and benefit cost ratio for each system were worked out as follows.

FIXED COST:

Fixed cost comprised of interest on initial cost and depreciation of the system. The interest calculated on the capital was at the rate of 10 per cent per annum. The depreciation of the system was worked out by straight line method as follows.

$$D = \frac{(I-S)}{L} \quad \text{----- (1)}$$

Where,

D = Depreciation per annum
I = Initial cost of system
S = Salvage value @ 10 %
L = Expected life period of the system

OPERATING COST:

Operating cost is the amount which is actually paid by the cultivator in cash throughout the cultivation period. Total operating cost comprised of power charges, maintenance and labour charges etc.Cost of cultivation is the total expenditure incurred for raising crop in a treatment. The cost included for this purpose consists of own or hired human labour, owned or hired bullock labour, value of seed, manures, fertilizers, pesticides and herbicides and irrigation charges etc.

TOTAL COST:

Total cost comprised of fixed cost plus operating cost. Total cost per ha was calculated for comparison on per hectare basis.

GROSS MONETARY RETURN:

This is worked out by considering the yield of produce and its selling price. Gross returns are the total monetary value of economic produce and by-products obtained from the crop raised in the different treatments and is calculated based on the local market prices.

NET RETURNS:

Net return is calculated by subtracting cost of production from gross return in each treatment.

BENEFIT COST RATIO:

Benefit cost ratio was estimated by using following formula.

$$\text{Benefit cost ratio} = \frac{\text{Gross return per season (Rs/ha)}}{\text{Total cost per season (Rs/ha)}} \quad \text{------ (2)}$$

It is expressed as returns per rupee invested. This index provides an estimate of the benefit to the farmer derived from the expenditure he/she incurs in adopting a particular cropping system. with the objective as to determine benefit-cost ratio of onion production under drip fertigation.

RESULTS AND DISCUSSION:

The various parameters regarding to economics *i.e.* cost of cultivation, gross return Rs/ha and B:C ratio was studied during the experimentation. The data presented in Table (2) revealed that highest gross return (Rs.151686) was recorded under application of F_3S_1 (120% RDF with 10 cm x 7.5 cm spacing) which had also realised in highest net return as well as cost benefit ratio. It was followed by F_2S_1 (100% RDF with 10 x 7.5 cm spacing) and F_1S_1 (80 % RDF with 10x7.5 cm spacing). Lowest gross return, net return as well as cost benefit ratio was found with application of F_1S_3 (80% RDF with 10 x 12.5 cm spacing).Hence, with the increase in transplant density under each seedling age there was improvement in crop economy due to enhancement in marketable bulb yield.

Higher B:C ratio of the treatment with narrow plant spacing due to more no. plants per unit area increased the total yield, gross return and net return also. However the highest yield per hectare recorded from the closer spacing could be attributed to greater crop biomass found with the narrower spacing.

Table 2. Economics of the different treatments

Treatment	Yield of onion (q/ha)	Gross return (Rs/ha)	Total cost (Rs/ha)	Net return (Rs/ha)	BC ratio (3/4)
F_1S_1	224.86	134916	55347	79569	2.44
F_1S_2	156.98	94188	57016	37172	1.65
F_1S_3	101.18	60708	58638	2070	1.04
F_2S_1	237.85	142710	55347	87363	2.58
F_2S_2	155.14	93084	57016	36068	1.63
F_2S_3	118.37	71022	58638	12384	1.21
F_3S_1	252.81	151686	55347	96339	2.74
F_3S_2	179.69	107814	57016	50798	1.89
F_3S_3	132.95	79770	58638	21132	1.36

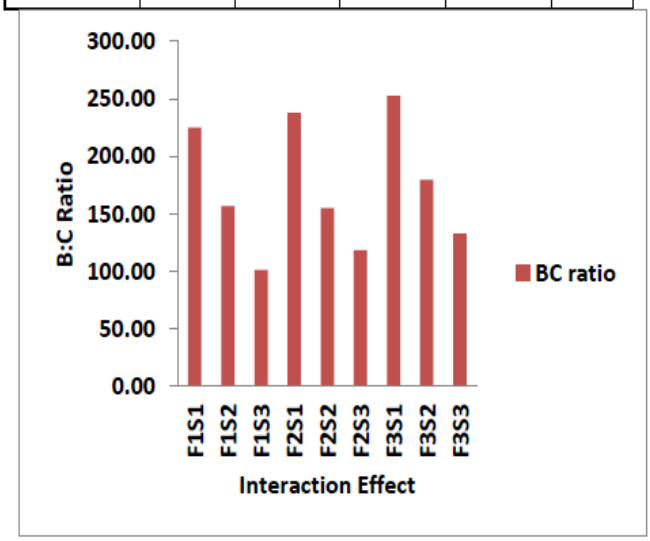

Fig.1 B:C ratio of different treatment combinations

CONCLUSIONS:

Economic evaluation of different treatments revealed that maximum gross return, net return as well as B:C ratio was recorded under application of F_3S_1 (120% RDF with 10 x 7.5 cm spacing), It was followed by F_2S_1 (100% RDF with 10 x 7.5 cm spacing) and F_1S_1 (80% RDF with 10 x 7.5 cm spacing). Lowest gross return, net return as well as B:C ratio was found with application of F_1S_3 (80% RDF with 10 x 12.5 cm spacing).

REFERENCES:

1) Anonymous, (2015). National Horticultural Research and Development Foundation.
2) Fanish SA (2013). Influence of drip fertigation on water productivity and profitability of maize, *African Journal of Agricultural Research,* 8(28):3757-3763.
3) Jat RA, Wani SP, Sahrawat KL, Singh P and Dhaka BL (2011). Fertigation in vegetable crops for higher Productivity and Resource Use Efficiency. *Indian Journal of Fertilizer* 7: 22-37.
4) Kadam G (2012). Study on response of white onion (*Allium cepa* L.) to deficit irrigation, M. Tech thesis, BSKKV, Dapoli, pp-02.
5) Kamble BM and Kathmale DK (2015). Effect of different levels of customized fertilizer on soil nutrient availability, yield and economics of onion, *Journal of Applied and Natural Science*, 7(2):817-821.
6) Rajkumar (2015). An Economic Analysis of Production and Marketing of Onion in Haryana, MSc. Thesis, CCS Haryana Agricultural University, Hisar, pp-01.