Studies on Weed and Fertilizer Management on Growth, Yield and Quality of Onion (*Allium cepa* L.) Under Lucknow Conditions

SUMMARY

of

THESIS

Submitted to
Babasaheb Bhimrao Ambedkar University
(A Central University)
Lucknow

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For the Degree of

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In

HORTICULTURE

By:

Tribhuvan Rai

Enrollment No. 265/14

Supervisor:

Dr. M.L. Meena

DEPARTMENT OF APPLIED PLANT SCIENCE (HORTICULTURE)
SCHOOL FOR BIOSCIENCES AND BIOTECHNOLOGY
BABASAHEB BHIMRAO AMBEDKAR UNIVERSITY
(A CENTRAL UNIVERSITY)
VIDYA VIHAR, RAE BARELI ROAD, LUCKNOW-226 025 (U.P.), INDIA

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Introduction

Onion **(*Allium cepa* L.)** belonging to the family Amaryllidaceae (2n=16) one of the most important vegetable crops all over the world. Onion is a condiment crop and consumed as a fresh in salad pickles or added in cooking dishes as a spice. Apart from furnishing nutrition, it provide relishing flavor to our diet. It also used to cure a wide array of physiological disorder such as Cough, Obesity, Insomnia, hemorrhoid and Constipation Our country accounts for one third of the world production in onion due to intensive cultivation.

Onion (*Allium cepa* L) is extremely important vegetable crop not only for internal consumption but also as highest foreign exchange earner among the fruits and vegetables. The export of onion during 2011 -12 was 13, 09,863.26 thousand tons with a value of Rs 1,722.85 crores.

Severe weed problems in onion and huge yield losses due to weed competition are a global problem. Weeds interfere with the development of onion bulb by competing with moisture nutrients, light and space, thereby reducing bulb yield to the extent of 40-80%.

The conventional methods of weed control i.e. hand weeding is no doubt effective but it is time consuming, cumbersome and under many situations becomes uneconomical. Onion is sown at very narrow spacing, therefore, cultural methods of weed control could not be performed and manual control becomes unaffordable. Hence, recommended pre and post emergence herbicides to control weeds in onion *viz*., pendimethalin, oxadiargyl, quizalofop-ethyl and fenoxaprop-p-ethyl mostly used by the farmers. The applied herbicides persist in soil. The persistence of any

herbicides may differ with agro-climatic situations. The residue chemist uses this concept to determine the rate at which a herbicide is degraded in soil which is costly. But cheap and easy method to know the herbicide residue in soil is bioassay in which, sensitive crops are grown in treated soil and provides useful information regarding herbicides residues. No systematic research work has been conducted to evaluate the persistence of most popular pre-and post-emergence herbicides against broad and narrow leaf weeds in onion in Saurashtra region of Gujarat. Therefore, the present study was undertaken. Weed control is an unavoidable need for successful production of vegetable crops like onion Product losses increase with weed infestation Controlling weed development during the Onion crop cycle is essential to obtain high yields and marketable product.

2. Research Issues

Almost everyone knows that onions are very important for health. Onion is a daily must have which helps you stay away from many infections and diseases. If you are sick and you are looking for a quick heal medicine, then onions are your best option.

The pungent odour might keep you away from onions but they are totally worth it. They can be cooked in almost all the recipes and can be consumed very easily. Onions are loaded with many chemicals which keep you away from illness and also make you glow due to its detoxification properties. Below are a few well known health benefits of onions. Onions possess enormous anti-ageing benefits. The antioxidant vitamins A, C and E fight against the damage caused by harmful UV rays as well as prevent free radical damage which is responsible for causing premature ageing of our skin. Onion is one of the richest sources of quercetin, the most powerful antioxidant that can keep your skin wrinkle-free. Vitamins and sulphur, on the other hand, protect your skin, and keep it soft and supple.

The anti-ageing qualities of onion can be attributed to the presence of sulphur-rich phyto-chemicals. Massaging your skin with fresh onion juice helps increase blood circulation and improves theoverall appearance of your skin by imparting a more youthful and radiant appearance. Never mind the tears they bring on—onions are an ace ally in your fight against disease. A prized member of the lily family, they lavish you with health benefits while adding oodles of taste to your food. A quick glimpse at their incredible health benefits:

- The phytochemicals in onions improve the working of Vitamin C in the body, thus gifting you with improved immunity.

- Onions contain chromium, which assists in regulating blood sugar.
- For centuries, onions have been used to reduce inflammation and heal infections.
- Do you enjoy sliced onions with your food? If yes, rejoice! Raw onion encourages the production of good cholesterol (HDL), thus keeping your heart healthy.
- A powerful compound called quercetin in onions is known to play a significant role in preventing cancer.
- Got bitten by a honeybee? Apply onion juice on the area for immediate relief from the pain and burning sensation.
- Onions scavenge free radicals, thereby reducing your risk of developing gastric ulcers.
- Those bright green tops of green onions are rich in Vitamin A, so do use them often.

3. Objectives of the Research Study

To best of our knowledge, limited work has been reported regarding oil extraction from African marigold plant parts and their phytochemicals screening. Keeping in view the importance of this crop, the present investigation titled **Studies on Weed and Fertilizer Management on Growth, Yield and Quality of Onion (*Allium cepa* L.) Under Lucknow Conditions"while** being under taking with the following objectives:

The present studies are focused on the following objectives:

1. **To ascertain the effect of weed and fertilizers management practices on various vegetative growth parameters of onion.**
2. **To find out effect of weed and fertilizers management practices on yield and quality of onion.**
3. **To work out cost: benefit ratio of different treatment**

4. Summary of the Thesis

- The maximum plant height at 30, 60 and 90 DAT was recorded under the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The maximum No of leaves/plant at 30, 60 and 90 DAT was found under the treatmentT_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The highest Neck thickness (cm) was noted under the treatmentT_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The minimum number of days taken for bulb formation was calculated under the treatmentT_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the other treatments. While, maximum number of days required for bulb formation was recorded in the control treatment T6 (Weedy check).
- The minimum no of days taken to maturity was recorded under the treatmentT_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the other treatments. While maximum number of days required for maturity was recorded in the control T6 (Weedy check).
- The bulb diameter was influenced significantly with the treatment T_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11}

(Pendimethalin+100% RDF+HW) respectively as compared to the other treatments .While, less bulb diameter was found in the control T6 (Weedy check).

- The bulb weight was also influenced significantly with the treatment T_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the other treatments .While, less bulb weight was found in the control T_6 (Weedy check).
- The more number of scales per bulb was observed with the treatment T_5 (Weed free) followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T6 (Weedy check).
- The yield per plot and per hectare was increased significantly under treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T6 (Weedy check).
- The maximum calcium content was found of the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The maximum phosphorus and sulphur content was found of the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).

- The maximum total soluble solids were found of the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The maximum vitamin C was found of the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The highest reducing sugars, on reducing and total sugars was recorded with the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The highest gross income per hectare was obtained with the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The maximum net return per hectare was obtained with the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).
- The maximum benefit: cost ratio per hectare was obtained with the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the control treatment T_6 (Weedy check).

- The minimum Weed density (no./m)^2 at 30, 60 and 90 DAT monocot and dicot observed in the treatment T_5(Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the other treatments. While, maximum Weed density (no./m)^{2}at 30, 60 and 90 DAT monocot and dicot was recorded in the control T_6 (Weedy check).
- The minimum Fresh weight of weeds (g/m^2) at 30, 60 and 90 DAT monocot and dicot recorded in the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the other treatments. While maximum Fresh weight of weeds (g/m^2) at 30, 60 and 90 DAT monocot and dicot was recorded in the control T_6 (Weedy check).
- The minimum Dry weight of weeds (g/m) ^{2} at 90 DAT monocot and dicot recorded in the treatment T_5 (Weed free), followed by T_{12} (Pendimethalin+125% RDF+HW) and treatment T_{11} (Pendimethalin+100% RDF+HW) respectively as compared to the other treatments. While, maximum Dry weight of weeds (g/m) ^{2at} 90 DAT monocot and dicot was recorded in the control T_6 (Weedy check).
- The minimum weed control efficiency (%) recorded in the treatment T_6 Weedy check (Control) followed by T_9 (Fluazipop-p-butyl Weed check) and T_4 (Hand weeding at 20 DAP) respectively as compared to the other treatments. While maximum weed control efficiency (%) recorded in T_5 (Weed free), and T_{12} (pendimethalin+125% RDF+HW).

CONCLUSION

The result obtained from present investigation led to an inference that treatment T_5 (Weed free), should be taken as most effective treatment followed by treatment T_{12} (Pendimethalin+125% RDF+HW) hand weeding was more effective than application of pendimethalin with the combination of 125% RDF, T11 (Pendimethalin+100% RDF+HW) and T_{10} (Pendimethalin+75% RDF+HW) respectively. Enhancing vegetative, morphological and qualitative parameters of onion plants and fruits respectively. Combination of herbicide and fertilizers with hand weeding showed the significant effect on various growth parameters, yield and yield attributing characters, quality and benefit : cost ratio of the crop .Therefore ,it is concluded that combination of herbicide and fertilizers with hand weeding may not only achieve highest onion yield and net returns but also improved quality of onion bulb.