

EVALUATION OF THREE ELITE VARIETIES OF ONION FOR OFF-SEASON PRODUCTION THROUGH SETS AT FARMERS' FIELD UNDER DAILEKH CONDITION

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ABSTRACT

The main objective of the study was to identify the appropriate varieties of onion for off-season bulb production through sets. Seeds of three varieties (Nasik Red, Pusa Red and Red Creole) were sown in the individual nursery beds in the second fortnight of January. Sets were lifted in the first fortnight of June and were stored well till set-planting. They were planted at farmers' field in the third week of August. Nasik Red produced the highest pooled plant population (5, 27,306/ha), biomass yield (22,702 kg/ha), and bulb yield (15,660 kg/ha) and similarly the individual bulb weight (22.64 gm) and was rated as superior one for high as well as early onion production through sets during late autumn and winter season under Dailekh Condition.

Key Words: *Allium cepa*, bulb, components, regenerative, sprouting

INTRODUCTION

Onion (*Allium cepa* L) is one of the most important commercial vegetables in Nepal. Common onion bulbs are produced during summer season by raising seedlings in the nursery during early winter season. A lot of the onion bulbs decay in the open stores during rainy season which results into scarcity of onion bulbs thereby causing the rise of price in autumn and winter seasons. Plenty of onion bulbs are imported from India from October to May. In order to meet the demands for onion bulbs during these lean seasons, the techniques of off-season onion production by sets has already been generated in the context of Kathmandu Valley of Nepal (Pun and Karmacharya, 1993). Regmi *et al.* (1986/87) reported that onion varieties Red Creole and Nasik-53 were good for onion bulb production from the sets of Monsoon planting as well as seedlings of early winter transplanting. RARS, Nepalgunj (2001) cited the superiority of Nasik Red over Red Creole in respect of high bulb yield when planted on September 6 in the field of RARS, Nepalgunj, situated in the Mid-Western Terai of Nepal. Nasik-53, Agrifound Dark Red, and Agrifound Light Red are reported to have been promising varieties for off-season production through sets in Northern Indian condition. For mid August planting, Nasik Red is preferred in Maharashtra (Anon, 1982). Even though Nasik Red is considered to be superior to Red Creole, most farmers usually plant Red Creole variety for this purpose (Author's experience, 2000). However, most of the research reports in this regard are concentrated either on Indian conditions or on the native regions exclusive of mid-hills of Mid-western and Far-western Regions of the country. In addition to this, no regionally authenticated information is available on the appropriate variety for onion bulb production from sets for the mid-hills of Mid-west and Far-west Regions. This paper describes the evaluation of three elite onion varieties on biomass yield, bulb yield and yield contributing other phenological characters to bridge that information gap.

MATERIALS AND METHODS

This study was carried out during 2001/02 and 2002/03 at seven sites of Agriculture Research Station, Dailekh located at the altitudes of 1000 - 1400 meters. Seeds of three elite onion varieties (Nasik Red, Pusa Red and Red Creole) were sown in individual nursery beds of two meters length and one meter breadth during the last week of January. Seedlings were reared as per required. Onion sets were lifted in the first fortnight of June. Sets with average diameter of 1.5- 2.0 cm were selected, tied in bunches and hanged in an airy storeroom until the planting of sets in the main field in the last week of August. The test production was carried out in farmer' fields at seven different locations for two years. Each farmer got three varieties for three unit-plot areas. The individual unit plot area of 2.25 square metre was considered as one replication for one treatment. A total of 150 sets were planted in the intra-rows and inter-rows of 10 × 15 cm in the individual plot. Well-decomposed farm yard manure @ 20 t/ha was incorporated into the soils prior to planting of sets. Nitrogen, Phosphorus and Potash were applied @ 60 kg, 100 kg and 100 kg/ha in the final land preparation. The next dose of Nitrogen (60 kg) was top-dressed in two equal halves: the first after 25 days and the second after 50 days. The other cultural practices such as weeding, irrigation and plant protection measures were followed as per needed. Bolting was discouraged by plucking off the flower stalks. The crops were harvested in 100-102 days after planting. Observations were made on days to harvest, plant population, biomass yield, fresh bulb yield, bolting percentage, individual bulb diameter, and individual bulb weight.

RESULT AND DISCUSSION

The three varieties were significantly different in yield ($P < 0.01$) component: biomass yield, fresh bulb yield and yield contributing characters (survival plant population and individual bulb weight) in both the years (Tables 1 and 2). The diameter of the individual bulb was significant ($P < 0.05$) in the first year 2001 but non-significant ($P > 0.05$) in the second year 2002 (Table 2). The evaluation of the three varieties of onion sets on yield components and yield contributing characters are cited and discussed accordingly.

Days to Harvest

When all three varieties of onion were harvested in 100-102 days after planting, the stalks as well as leaves of Red Creole were absolutely green despite partially and slightly yellowish in case of Nasik Red and Pusa Red.

Bolting of Stalks

The 'Red Creole' variety had the fewest pooled bolting stalks (2.20 per cent) and followed by 'Nasik Red' (6.44 per cent) whereas 'Pusa Red' variety had the highest (17.70 per cent) pooled bolting (Table 2). Differences in bolting due to varieties were observed in which 'Nasik Red' had more bolting as compared to 'Red Creole' (Bhattarai *et al.*, 1995) at Lumle, Kaski, Nepal. The result of bolting is nearly in agreement with that results observed by RARS, Nepalgunj (1996/97), as Red Creole variety had revealed the lowest bolting (10 per cent) in Banke, Nepal. Additionally, the 'Red Creole' variety against bolting, recorded by ARS, Surkhet, Nepal (1995) is also in conformity with the recent result of the study in this regard.

Plant population

The three varieties significantly influenced the pooled population. The variety Nasik Red contributed to the highest pooled plant population (5,27,306 plants/ha) and followed by Pusa Red (5,16,826 plants/ha). Red Creole variety, however, gave the lowest pooled plant population i.e 4,40,000 plants/ha (Table 1). As regards the pooled plant population; Nasik Red was statistically at par with Pusa Red. The highest plant population noted in Nasik Red could presumably be due to high regenerative and quick sprouting capacity of the sets.

Biomass yield

As mentioned in Table 1, Nasik Red variety had the highest pooled biomass yield (22,702 kg/ha) followed by Pusa Red (20,460 kg/ha). The pooled biomass yields of these two varieties were statistically at par. The result in this context is more or less in corroboration with that reported by Bhattarai *et al.*, (1994) at Lumle, Kaski; as they recorded the higher biomass of 'Nasik Red' than that of 'Red Creole'. All the same, the experimental sites that were situated at higher altitudes, the 'Red Creole' variety contributed to the higher biomass yield (43,600 kg/ha) than 'Agrifound Dark red' (35,900 kg/ha) and 'Nasik-53' (33,700 kg/ha) at Lumle, Kaski (LARC,1992/93). The variation of results could possibly be due to plant population per unit area, soil fertility, varietal adaptiveness accompanied by vigorous vegetative growth.

Fresh bulb yield

The three varieties of onion sets significantly influenced the pooled bulb yield, as the Nasik Red variety contributed to the highest pooled bulb yield (15,660 kg/ha) followed by Pusa Red (12,616 kg/ha). However, the Red Creole variety had the lowest (7,098 kg/ha) pooled bulb yield (Table 1). This result was obtained possibly due to extremely low concentration of growth retardants in the sets of Nasik Red in comparison to the sets of other two varieties that could permit the early and rapid sprouting of sets for the sake of high plant population. Finally, the highest bulb yield was obtained in Nasik Red variety.

Weight and diameter of an individual bulb

The three elite varieties of onion sets significantly influenced the pooled weight of the individual bulb, which was highest in Nasik Red (22.64gm) and followed by Pusa Red (22.43 gm). The variety Red Creole, conversely, revealed the lowest pooled weight (19.85 gm) of the individual bulb (Table 2). The pooled weight of individual bulb of Nasik Red was statistically at par with Pusa Red. The higher bulb weight might be due to varietal traits for favourable growth and development of bulb.

As regards the pooled diameter of individual bulb, the three elite varieties of onion sets did not influence at all, even though it was recorded as significant in the first year 2001.

CONCLUSION

For off-season onion production through sets, Nasik Red was found as the best one in comparison to two other varieties under mid-hill condition of Dailekh. Moreover, to fetch early market price, this variety is somewhat earlier than the recommended variety Red Creole.

Anyway, the farmers in this District may prefer to continue planting Red Creole variety to extend the supply of green onion in nearby market until the late season. In addition to the breakthroughs made in recently implemented trial, the other promising varieties (Agrifound Dark Red, Agrifound Light Red, Anmol-51, Giant Red Globe, and Lanka Special) with different planting dates will have to be tested further and verified for fresh bulbs and green vegetables accordingly for off-seasons.

Table 1: Effect of three elite varieties of onion sets on yield component at ARS, Dailekh during 2001-2002

Onion Varieties	Days to harvest in the year			Plant population in the years			Biomass yield (kg/ ha) in the years			Fresh Bulb yield (kg/ha) in the years		
	2001	2002	Pooled	2001	2002	Pooled	2001	2002	Pooled	2001	2002	Pooled
1. Nasik Red	100	102	101	467311	587302	527306	17080	28324	22702	12342	18978	15660
2. Pusa Red	100	102	101	450160	583493	516826	11453	29467	20460	8356	16876	12616
3. Red Creole	100	102	101	359366	520635	440000	6613	16622	11618	4818	9378	7098
Grand Mean	100	102	101	425612	563810	494711	11715	24804	18260	8506	15077	11791
Cv per cent	-	-	-	20.36	10.49	15.42	32.80	35.48	34.14	28.10	35.28	31.69
F-test	-	-	-	**	**	**	**	*	**	**	*	**
NS	-	-	-	-	-	-	-	10.249	-	-	6204	-
*	-	-	-	71130	45865	58450	6276	-	8263	3898	-	5501
**	-	-	-	<0.01	<0.01	<0.01	<0.01	<0.05	<0.01	<0.01	<0.05	<0.01

NS indicates non-significant (P>0.05)

*indicates significant (P<0.05)

** indicates highly significant (P<0.01)

Table 2: Effect of three elite varieties of onion sets on yield contributing components at ARS, Dailekh during 2001-2002

Onion Varieties	Diameter of an individual bulb (mm)			Weight of an individual bulb(gm)			Bolting per cent at harvesting time		
	2001	2002	Pooled	2001	2002	Pooled	2001	2002	Pooled
Nasik Red	38.00	37.00	37.50	17.14	28.14	22.64	8.72	4.16	6.44
Pusa Red	33.00	37.00	35.00	14.86	30.00	22.43	15.00	20.40	17.70
Red Creole	32.00	34.00	33.00	12.00	17.00	14.50	2.08	2.30	2.20
Grand Mean	34.00	36.00	34.00	14.66	25.04	19.85	8.60	8.95	8.77
Cv per cent	12.20	19.77	14.98	17.05	26.72	21.88	-	-	-
F-test	*	NS	NS	**	**	**	-	-	-
LSD at 5 %	4.00	-	-	-	-	-	-	-	-
LSD at 1 %	-	-	-	4.08	10.98	7.50	-	-	-
P-value	<0.05	>0.05	>0.05	<0.01	<0.01	<0.01	>0.05	>0.05	>0.05

NS indicates non-significant

*indicates significant

** indicates highly significant

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