



Research Article

Evaluation and Release of High Yielding and High Oil Containing Mustard for Terai and Inner Terai of Nepal

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Abstract

In Recent years, cultivation of Mustard (*Brassica juncea*) is growing popularity but there is lack of suitable high yielding and oil contenting variety in Nepal. With Objective of identifying and releasing of high yielding variety, evaluation of exotic genotypes were done in the research field and farmers field. Coordinated Varietal Trial (CVT) was conducted for three years in three different location (Nawalpur, parwanipur and Khajura) in RCBD design. 4 Elite genotypes were selected and further evaluate under Coordinated Farmer Field Trial (CFFT) for 5 years where each farmer was considered as Replication. Nutrients Analysis was done to find out the moisture, oil and protein content of selected elite genotypes. In combined ANNOVA of CVT, ICJ 9704 was found to be high yielding genotypes. Similarly, In CFFT, genotypes was significantly for yield where ICJ 9704 produced highest yield (906.75 kg/ha) where as Divya, Pusa Jagarnath and Krishna produced yield of 798.12 kg/ha, 790 kg/ha and 767.392 kg/ha. ICJ 9704 has high oil content 37.3 % with 36.3 % protein content. In 2017, ICJ 9704 was release as Morang rayo and was recommended to grow in the terai and inner terai. Hope this variety will be popular among mustard growing farmer and will help to meet the national demand of the Nation.

Introduction

Mustard (*Brassica juncea*) also called as rayo/ raichi/ tora is most potential winter oilseed crop of Nepal. It is gaining popularity day by day and as compared to previous year, its area and production is in increasing trend. The area under mustard (Rayo) cultivation in Nepal was 3879 ha, production 3843 mt and productivity 0.990 mt /ha (MoALD, 2019) but substantial amount of acreage has been found under mixed cropping with wheat, lentil, chickpea

and linseed (Ghimire *et al.*, 2000). Two varieties of mustard namely, Krishna and Pusa Bold have been released for general cultivation in irrigated as well as in rainfed condition. The limited numbers of varieties and increasing cultivated are of mustard year by year shows that there is indispensable need of better breeding technique and better screening techniques to increase the yield potential of this crop. The unavailability of high yielding varieties may be

one of the causes of low yield. On the other hand, very limited genetic stock with narrow genetic base is available at our condition. Improvement of *Brassica juncea* has mostly been confined to the exploitation of the naturally occurring genetic variability in the cultivated species. *Brassica juncea* commonly cultivated in Indian subcontinent has limited variability left for direct selection for higher seed yield (Kumar & Singh, 1998). Keeping these points in view, to select and release high yielding lines of mustard, series of trials like Coordinated varietal trials (CVT) and Coordinated Farmers Field Trial (CFFT) were conducted at NORP, Nawalpur, RARS, Parwanipur and RARS, Nepalganj in various year (ORP- Annual Report 2013/14, 2014/15, 2015/16).

Materials and Methods

14 Local and Exotic germplasm selected from Observation nursery and Initial Yield trails were evaluated in Coordinated varietal trial under different environment condition of Nepal (Oil Seed Research Program, Sarlahi, Regional agriculture Research Station, Parwanipur, Regional Agricultural Research Station, Khajura,) in 3 different on succeeding year, 2014, 2015 and 2016. Coordinated Varietal Trial was conducted in Random Complete Block Design (RCBD) with 14 Genotypes including local genotypes in 3 replications with the plot size of 5 * 2.1 m². Among the 14 genotypes, 4 genotypes were selected for Coordinated Farmer field Trials in the same location in 2015, 2016, 2017 A.D (ORP-Annual Report 2014/15, 2015/16, 2016/17) with plot size of 50 m² were each farmer was considered as Replication. Chemical fertilizers were applied @ 60:40:20 kg/ha. Similarly, nutrient analysis (moisture, fat and protein content) was done in National Food Technology Research Centre, Narc. Computer based Statistical software like Crop stat and ADEL-R was used to analyze the data.

Results and Discussion

Different analysis like ANOVA of CVT and CFFT and nutrient analysis was done to find the best Mustard variety for the wider range of Nepal. In combined ANOVA CVT of 3 year, For the yield, genotype was highly significant (p value= 0.007) to each other, location was not significant (p value=0.12) and genotype and environment interaction was also not significant (p=0.12). Among 14 genotypes, ICJ 9704 has highest yield with 1146.589 kg/ha whereas ICJ 01-40 has lowest yield which measure 695kg/ha.

In CFFT, there was high significant difference (p value= 0.0033) in yield among the four elites selected genotypes. ICJ 9704 was consider to be highest yielding with the yield of 906.123 kg/ha in farmer field condition followed by Divay (798.127 kg/ha), Pusa jagarnath (790.007 kg/ha) and Krishna (767.392 kg/ha) which is show in table no.

Simially, in Nutrient analysis, the result showed ICJ 9704 with low moisture content (7.62%) and with high fat content

(37.3 %) among the selected elite genotypes. Simialry, the nutrient analysis showed that ICJ 9704 has 36.3 protein content. From the all the test, ICJ 9704 was considered to be highest yielding genotypes with high oil content among the tested genotypes.

Table 1: ANOVA table of Coordinated Variety Trials (CVT)

Genotypes	Yield (kg/ha)
ICJ 9704	1146.589
ICJ 9701	899.5222
RH 30	882.0667
PusaJaganath	873.6667
Rohini	860.9556
RH 811-3	831.0444
ICJ 01-62	785.5556
PusaAgarani	774.0778
ICJ 9708	763.5556
ICJ 01-11	758.5556
T 59	751.8889
Krishna	733.7
ICJ 01-56	711.4444
ICJ 01-40	695.1111
Grand Mean	819.12
CV	26.88
LSD	205.67
P Value (Genotype)	** (0.000791)
P Value (Environmnet)	NS (0.129766)
P value(G*E)	NS (0.877142)

Table 2: ANNOVA of Coordinated Farmers Field Trial (CFFT)

Genotypes	Yield
ICJ 9704	906.755 a
Divya	798.127
PusaJaganath	790.007
Krishna	767.392
GRAND MEAN	815.57
LSD	74.78
P (0.05)	** (0.0033)
CV	9.9

Table 3: Nutrient analysis of mustard

T.N.	Varieties	Moisture	Fat (Oil) %	Prote in
1	ICJ 9704	7.62	37.3	36.3
2	Divya	8.01	37	37.8
3	PusaJagannath	7.43	37.1	36.3

Conclusion

In context to Nepal, there is lack of manpower, technology and faculties to generate the new genotypes. To find the new promising varieties suitable for Nepal, testing of the exotic genotypes is the best way of the time being. With the result of continuous trial for 12 years (Observation nursery, Initial yield Trial, Coordinated farmers Field Trial, Coordinated varietal trail,) Proposal was present in Seed Quality Control Centre (SQCC) to release ICJ 9704 as a variety. Finally, In 2017, ICJ 9704 was release as Morang Rayo inheriting the potential of high yield with high amount of oil content and protein.

Author's Contribution

All authors contributed equally in the all stages of research works, manuscript preparation and finalization.

Conflict of Interest

The authors declare that there is no conflict of interest with present publication.

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