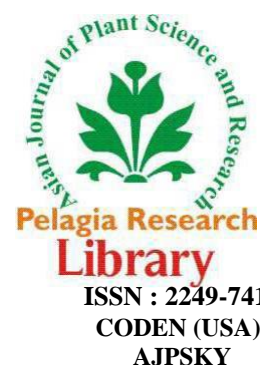




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# Adaptation study of mung bean (*Vigna radiata*) varieties in tepi, south wester Ethiopia

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### ABSTRACT

In order to find the adaptability of mung bean varieties a study was carried out at Tepi research center in 2017 and 2019 cropping season. Three varieties were arranged in RCBD design in three replications in six rows with 2.4m x 2.4m (9.6m<sup>2</sup>) with spacing of 40cm between rows and 5cm between plants. Days to flowering, Days to maturity, plant height, Number of pods per plant, were non-significantly affected by varieties. Number of branches per plant, hundred seed weight and grain yield per hectares were significantly influenced by variety. The highest grain yield (2326.8kg /ha) was obtained from NUL-1 variety, followed by Shewa robit (2302.6kg/ha). on the opposite, the lowest grain yield value (1946.3kg/ha) was obtained by variety N-26, Thus both NUL-1 and Shewa robit varieties were best adapted in Tepi and it will be used for production.

**Keywords:** Plant Breeding; Genetics

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### Introduction

Mung bean (*Vigna radiata* (L.) Wilczek) is a legume cultivated for its edible seeds and sprouts across Asia. It belongs to family Fabaceae and sub family papilionaceae with diploid chromosome number  $2n = 2x = 22$ . There are three subgroups of *Vigna radiata*: one is cultivated (*Vigna radiata* subsp. *radiata*), and two are wild (*Vigna radiata* subsp. *sublobata* and *Vigna radiata* subsp. *glabara*). Mung bean (*Vigna radiata* var. *radiata*) is believed to have originated in Indian subcontinent [1,2]. Since India has a wide range of genetic diversity of cultivated, as well as of weedy wild types of mung bean, it is considered as the region of its first domestication [3]. Mung bean is a rich source of nutrient and is considered a healthy food. It constitutes an important place in vegetarian diets. Mung bean seeds are a good source of dietary protein and contain higher levels of folate and iron than most other legumes [4]. Sprouted seeds of mung bean is equivalent to fresh fruit in respect of nutrient content as it contains vitamins A, B, C, E and minerals, such as, iron, calcium and phosphorus. Besides, there is an increase in the thiamine, niacin and ascorbic acid content with sprouting. On dry weight basis, it contains 22-28 percent protein, 1.0-1.5 per cent fat, 3.5-4.5 percent fiber, 4.5- 5.5 per cent ash and 60-65 percent carbohydrate. It is also a rich source of essential amino acids like isoleucine, leucine, lysine and phenylalanine [5].

Mung bean is originated from India and it has diversified to East, South, Southeast Asia (China) and some countries in Africa. It is also a recent introduction in Ethiopian pulse production and grown in the north eastern part of Amhara region (North Shewa, Oromiya special zone and Southern Wollo), SNNPR (Gofa area) and pocket. Mung bean is mostly produced in Amhara regional state particularly in some areas of North Shewa and South Wollo as well as in some woreda's of Benishangul Gumuz regional state [6]. Despite its growing demand in the international market there is chronic supply gap in Ethiopia from the production side. However, Ethiopia's mung bean export has grown slightly from time to time [7], there is a need to expand its production to other potential areas of Ethiopia. The study area is potential for lowland pulses like mung bean. But the improved varieties are not yet introduced to farmers

in Teppi area. Therefore, this activity was carried out to investigate and select the best adapted mung bean variety for the study area

### Materials and Methods

**Description of the study area:** The experiment was conducted at Tepi Agricultural Research center, which is located 611km from Addis Ababa in the south –western part of Ethiopia. The experimental site is situated of 1200 meter above sea level, latitude of 7° 3' and longitude 35° 18' E. The site receives a mean annual rainfall of 1678 mm with an average minimum and maximum temperature of 15.4 and 29.5 °C, respectively. The soil textural class of the experimental area is clay with fine texture 30-80% with PH of 6.9-8 (neutral to moderately alkaline [8]).

**Experimental Procedures:** The experiment was lay down in RCBD with three replications. A total of three varieties Shewa robit, N-26 and NUL-1 were used in the study. The plot size was 4 m × 2.4 m (9.6 m<sup>2</sup>) having 6 rows with harvestable plot size of 1.6 m × 4 m (6.4 m<sup>2</sup>) and a spacing of 40cm between rows and 5cm between plants. 1 m between replication, 40cm between plots was maintained. Management practices like weeding, and thinning were done uniformly to all plots as per recommendations.

**Data Collection and Statistical Analysis:** During the experiment data on individual plant basis plant height (cm), number of pods per plant, number of branches per plant, and on plot basis days to 50% flowering, days to maturity, grain yield (k/ha), 100 seed weight (g) were collected and analyzed. Data on phenological, growth and yield components were subjected to analysis of variance (ANOVA) using SAS computer package version 9.1 [9] at P<0.05. when there were a significant difference among the treatment means the least significant difference (LSD) test will be used to compare the mean separations at P<0.05 [10].

### Result and Discussion

**Analysis of variance for agronomic traits:** The analysis of variance for yield and other agronomic characters is presented in Table 1. The result revealed that varieties showed significant difference ( $P \leq 0.05$ ) for grain yield, number of branches per plant and hundred seed weight. Year had showed a highly significant difference ( $P \leq 0.001$ ) for plant height, number of pods per plant, number of branches per plant, hundred seed weight and grain yield while date of 50% flowering was non -significant for year. Trt\* year interaction effect were significant only for grain yield and non -significant for date of 50% flowering, date of 90 % maturity, plant height, number of pods per plant, number of branches per plant and hundred seed weight. The non-significant response of varieties across years indicated that varieties would respond in similar manner.

**Table 1:** mean square from analysis of variance for performance of mung bean varieties in Phenology and Growth traits.

Sov	DF	DF	DM	PH	NPP	NBP	HSW	GY
Rep	2	1.05	40.22	165.04	20.12	43.1	0.08	85.32
Trt	2	23.72	8.22	151.38	52.61*	12.41	2.76*	27.23*
Year	1	50*	9.38	1830.12**	633.68**	2742.93**	16.51**	74.02**
Trt*Year	2	22.16	0.22	124.68	45.29	21.8	0.21	32.60*
Error	10	7.06	9.82	133.11	11.79	61.82	0.5	6.34

sov=source of variation, DF=degree of freedom, \*=significance \*\*=highly significance

**Growth and phenological parameters:** Days to 50% flowering: The effect of variety on days to 50% flowering was not significant (Table 2) in which the maximum days to 50% flowering were observed in variety Shewa robit (47.83days), were as the minimum value was observed in NUL-1 having (44.167 days (Table 2)

**Table 2:** Mean performance of mung bean varieties for phenology and growth traits.

Varieties	DF	DM	PH	NPP	NBP	HSW	GY
NUL-1	44.167B	81.83A	68.2A	12.43BA	18.63A	6.92BA	2326.8A
N-26	44.67BA	80.83A	60.03A	11.2B	16.37A	7.61A	1946.3B
Shewarobit	47.83A	83.17A	69.18A	16.83A	15.97A	6.26B	2302.6A
mean	45.56	81.94	65.81	13.49	16.99	6.93	21.92
CV (%)	5.83	3.82	17.53	25.46	46.28	10.21	11.49
LSD	3.42	4.03	14.84	4.42	10.12	0.91	3.24

DF=Date of 50% flowering, DM=Date maturity, PH=plant height, NPP=Number of pods per plant, NBP=Number of branches per plant, HSW=Hundred seed weight and GY=grain yield per hectares.

Days to 90% maturity: Table 1 indicated that days to 90% maturity were non-significant for the variety. The maximum days to 90% maturity was observed in variety Shewa robit (83.17 days) and the minimum days to 90% maturity also observed in N-26 (80.83 days).

Plant height: The analysis of variance showed that variety did not have significant influence on plant height (Table 1) higher plant height (69.18cm) was obtained at Shewa robit and the lower plant height was obtained from N-26 which is 60.03 cm.

**Yield components:** Number of pods per plant: Number of pods per plant is the main factors in determining the yield performance in leguminous plants. Number of pods ultimately determine the productive capacity of mung bean. The analysis of variance showed that the variety had significance influence on pods per plant. Significantly higher (16.83) pods number per plant was obtained at Shewa robit variety. But significantly lower (11.2) number of pods per plant was obtained at N-26 variety (Table 2). Similarly, the above results, Wedajo [11]; and Rasul, et al, [12] stated that mung bean cultivars had significant effect on number of pods per plant.

Number of branches per plant: Analysis of variance, Table1 showed that there is no significance difference for number of branches per plant between variety. The mean comparisons showed that NUL-1 had maximum number of branches per plant (18.63) and the minimum number of branches per plant (15.97) was obtained from Shew robit variety.

Grain yield: Dry matter production and its transformation in to economic yield is the main result of diverse physiological, biochemical, phenological and morphological action takes place in the plant system. There was significant difference on grain yield with the varietal effect of mung bean crops. Considerably higher grain yield (2326.8 kg/ha) was obtained from NUL-1 variety. On the other hand, the lower grain yield value (1946.3kg/ha) was obtained at N-26. (Table 2). Significant effect of mung bean genotypes on grain yield had been reported by Wedajo [11]; Rasul, et al. [12] and Omid [13,14].

### Conclusion and Recommendation

Mung bean (*Vigna radiata* L. Wilczek) is an essential short duration, self-pollinated diploid legume crop with high nutritive values and nitrogen fixing ability. From this study the highest grain yield (2326.8kg /ha) was obtained from NUL-1 variety, followed by Shewa robit variety (2302.6kg/ha). On the opposite, the lowest grain yield value (1946.3kg/ha) was obtained from variety N-26. Therefore, it could be concluded that NUL-1 variety might be recommended for farmers and growers of mung bean in the study area

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