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Evaluationof Greater Yam (*Dioscoreaalata*L.)Germplasm on Yield and Quality

Loitongbam Sulochana Deviand A.K. Bijaya Devi

Department of Horticulture

College Of Agriculture, Central Agricultural University, Lamphel, Pin: 795004, Imphal, Manipur, India.

ABSTRACT

A field experiment was conducted in the Horticultural Research Farm, Andro, Imphal- East during 2014-2015. The experiment consisting of seven treatments was laid out in randomized block design with three replications. The treatment consisted of IGDa-4(T_1),IGDa-2(T_2), NAUDa-2(T_3), Da-199(T_4), Da-11 (T_5), Da-25 (T_6), and Local as check.The result revealed that yield and other parameters of greater yam *viz*., length of tuber(27.40 cm), single tuber weight(1228.77g) tuber weight per plant (1228.77g) and tuber yield (15.17tha^{-1}) were recorded highest in Local while diameter of tuber(12.13 cm) and number of tubers per plant(1.67) were recorded highest in Da-11 and Da-199. Quality analysis revealed that treatment IGDa-2 as richest source of starch (21.67%) while treatmentDa-11 as maximum dry matter % (34%).

Key words: Dioscorea*alata* L., Germplasm,Yield, Starch, Dry matter.

Greater yam *(Dioscoreaalata L.*) is a climbingmonocotyledonous tuber crop belongs to thefamily of Dioscoreaceae and it is reported tobe an old crop species native to South East Asia (Burkill, 1951). Nigeria accounts for about 70% of the world's production of yam, generating a global annual output of over 33 million metric tonnes.However, in India the data on cultivated area, production and productivity of *D.alata* is lacking.Several environmental factors affect the growth of yam, in particular, the development of the flowers, tubers and bulbils. Tuber growth in yam is slow immediately after initiation and then it becomes very rapid at full canopy formation and finally slows down during maturation with a loss in dry matter (Onwueme, 1978).Yam yield is influenced by numerous environmental factors such as water (soil moisture), temperature, light and photoperiod. Other constraints to yam production include biotic factors such as pests and diseases in the field and in the store. These factors have led to decrease in production over the years and have prompted breeding activities to generate high yielding varieties with some tolerance to environmental stresses. Evaluation of local cultivars or land races into different morphological variability groups makes it easy for the plant breeder in identifying and selecting the desired promising lines of different character.

The compositions of Greater Yam are given below (per 100g in Fresh weight basis):

Principle Nutrient	value
Vitamin A	117 µg
Vitamin C	25 mg
Minerals	0.5-1 %
Total sugars	0.5-2 %
Proteins	2-4 %
Starch	20-25 %
Dry matter	20-40 %

Source: Bradbury and Holloway (1988).

Evaluation of cultivars collection can be useful for germplasm curators and may also help in clarifying the evolutionary history of a crop in a region (Zeven and Schachl, 1989).

MATERIALS AND METHODS

The experiment was conducted in the Horticultural Research Farm (HRF), Andro, Imphal-East during 2014-2015. It is situated at a distance 32 Km from Central Agricultural University Head Quarter, Imphal. It is located at latitude of 24°45.89' with longitude measuring 94°03.46' and an elevation of 808-940 m above mean sea level. The experiment was design in RBD with 3 replication and 7 treatments:

T_1- IGDa-4, T_2- IGDa-2, T_3- NAUDa-2, T_4- Da-199, T_5- Da-11, T_6- Da-25, T_7-Local. The details of observations at harvest (240 Days after planting) are given below:

1. Diameter of the tuber (cm): Tuber diameter were recorded in cm at largest part of the tuber from the (5) random samples at harvest.
2. Length of the tuber (cm): Tuber length were recorded in centimeter by scale from the (5) random samples at harvest.
3. Single tuber weight (g): Single tuber weight were recorded from the 5 random samples at harvest and expressed in gram.
4. Number of tuber per plant: Tuber obtained from 5 random samples were counted and averaged at harvest.
5. Tuber weight per plant (g): Tuber obtained from 5 random samples were weighed in gram and averaged at harvest.
6. Tuber yield (tha^{-1}): The harvested tubers from each net plot were weighed separately. The tuber yield per plot obtained was converted into t/ha.
7. Starch content (%) of tuber**:** The tuber starch content was analyzed by theAnthrone reagent method as described by Thimmaih (2006)
8. Dry matter percent of the tuber: Dry matter (DM) content was worked out by using the formula:

Dry matter percent of the tuber

$$= \frac{\text{Dry weight of the tuber}}{\text{Fresh weight of the tuber}} \times 100$$

RESULTS AND DISCUSSIONS

In the experiment, there were significant differences in diameter of the tuber among the treatments ranging from 8.5 cm – 12.13 cm. The maximum diameter of the tuber at harvest was recorded from the treatment T_5 (12.13 cm) which was significantly higher than other treatments and minimum was recorded from the treatment T_4 (8.5 cm)at harvest (Table 1). This finding was in agreement with the finding of Islam *et al.* (2011) in yam.

There were significant differences among the treatments in relation to length of the tuber ranging from 15.23 cm – 27.40 cm. The maximum length of the tuber at harvest was recorded from the treatment T_7 (27.40 cm) which was significantly higher than other treatments and minimum was recorded from the treatment T_5 (15.23 cm) at harvest(Table 1). This finding was in agreement with the findings of Islam *et al.* (2011) in yam.

In the experiment, there were significant differences among the different treatments in respect to single tuber weight per plant. The tuber yield in yam was dependent on its photosynthetic efficiency and this was correlated with leaf area. The maximum single tuber weight per plant was recorded from T_7 (1228.77g) which was significantly higher than other treatments. The minimum single tuber weight per plant was recorded from T_4 (494.63g) at harvest (Table 1). This finding was supported by Agbaje*et al.* (2003) in yam.

At harvest, it was observed that the number of tuber per plant was almost same (1 tuber per plant) except the treatment T_4 (1.67) which was found highest(Table 1). This finding was in agreement with the finding of Behera*et al.* (2009) in yam.

In the experiment, there were significant differences among the different treatments in respect to tuber weight per plant.

Maximum tuber weight per plant was recorded from treatment T_7 (1228.77g) which was significantly higher than other treatments. The minimum tuber weight per plant was recorded from the treatment T_4 (826.23g) at harvest(Table 1). The magnificent increased in the yield might be attributed to larger leaf area for better exposure to available sunlight. This finding was supported by Islam *et al.* (2011) in yam.

In the experiment, there were significant differences among the different treatments in respect to tuber yield per hectare. The maximum tuber yield was recorded from the treatment T_7 (15.17tha^{-1}) which was significantly higher than other treatments and followed by treatment T_1 (12.13tha^{-1}). The minimum tuber yield was recorded from the treatment T_4 (10.17tha^{-1}) at harvest(Table 1). The magnificent increased in the yield might be attributed to larger leaf area for better exposure to available sunlight. These findingswere in agreement with the findings of Eruola*et al.* (2012) in white yam,Khandekar *et al.* (2000) in greater yam and Mhaskar*et al*. (2013) in greateryam.

Table 1Study onyield attributesof different germplasms of greater yam at harvest

Treatments	Tuber diameter (cm)	Tuber length(cm)	Single tuber weight (g)	Number of tuber per plant	Tuber weight per plant(g)	Tuber yield (tha^{-1})
T_1	11.33	24.13	982.50	1.00	982.50	12.13
T_2	9.70	22.73	915.30	1.00	915.30	11.30
T_3	10.70	24.10	980.10	1.00	980.10	12.10
T_4	8.50	19.23	494.63	1.67	826.23	10.17
T_5	12.13	15.23	848.07	1.00	848.07	10.47
T_6	9.50	21.27	920.97	1.00	920.97	11.40
T_7	10.23	27.40	1228.77	1.00	1228.77	15.17
S.Ed(±)	0.13	0.45	24.95	0.018	20.42	0.25
CD (0.05)	0.29	0.99	54.37	0.039	44.49	0.55

From the study of quality parameters among the treatments, it was observed that starch content (%) was recorded maximum from T_2 (21.67%) which was significantly higher than the other treatment except T_1 (21.23 %) and T_7 (20.87%). The minimum tuber starch content (13.8 %) was recorded from T_4 (Table 2)).

From the present study it was obtained that dry matter percentage (%) was recorded maximum from T_5 (34%) which was significantly higher than the other treatments. The minimum dry matter percentage (21.97 %) was recorded from T_2. These results were in conformity with the findings of Easwari Amma, *et al.* (1989), Lebot *et al.*, 2005 and Rugchati and Thanacharoenchanaphas(2010).

Table2 Study on Starch content (%) and Dry matter percentage (%) of different germplasms of greater yam

Treatments	Starch content (%)	Dry matter percentage (%)
T_1	21.23	29.00
T_2	21.67	21.97
T_3	16.47	29.00
T_4	13.80	27.00
T_5	18.60	34.00
T_6	19.10	26.00
T_7	20.87	30.03
S.Ed(±)	0.41	0.60
CD (0.05)	0.90	1.32

From the studies it can be concluded that among the treatments, treatment T_7 (Local) was found superior with respect toyield while treatment T_2 (IGDa-2) and treatmentT_5 (Da-11) recorded the highest starch content and dry matter content respectively.

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