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Effect of Seed Cormel Weight on Growth and Yield of Taro (*Colocasia esculenta* (L.) Schott.) in Punjab Conditions

Taro, also known as *arvi* in Punjab, (*Colocasia esculenta* (L.) Schott.) belongs to the *Araceae* family is grown throughout the humid tropical and sub-tropical areas for its edible nutritious corms, cormels and leaves. Being a native to India, it ranks fifth among root and tuber crops, after potato, cassava, sweet potato and yams. In India, it is cultivated in almost all the states but mainly cultivated in Uttar Pradesh, Bihar, West Bengal, Assam, Punjab, Odisha, Andhra Pradesh and Tamil Nadu (Cheema et al*.,* 2007). Taro is consumed as vegetable being rich in minerals and vitamins. The digestibility of taro starch has been estimated to be 98.8% and is used in baby foods, hypo-allergic foods and as a cereal substitute in diets for victims of celiac disease (Saikia et al*.,* 2010).

Yield and yield contributing parameters of tuber crops are influenced by several factors like genotype, geographical locations, climate, cultural practices, soil type, planting material etc. Among planting material, tuber seed size and weight play a significant role on yield and yield contributing characters (Faisal et al., 2009; Sikder et al., 2014). However, taro is propagated through corms and cormels and their weight and size make high impact on the yield and growth of taro (Siddique et al., 1988; Faisal et al*.,* 2009). Hence, present investigation was carried out to study the effect of weight of cormel on growth and yield of taro under Punjab conditions.

A field experiment was conducted at Vegetable Teaching Farm, Department of Vegetable Science, Punjab Agricultural University, Ludhiana (Latitude 30°54' N, Longitude 75°51' E and Altitude 243 m above mean sea level) during 2011-13. The taro variety Punjab Arvi-1 was planted with four replications in randomized block design. There were five treatments comprising different weight of cormel (>75 g, 60-75 g, 45-60 g, 30-45 g and <30 g). The seed cormels are sown 6 to 7.5 cm deep by keeping 60 x 30 cm distance between rows. The fertilizer dose of $N-P_2O_5-K_2O$ @ 80-60-80 kg ha^{-1} was applied. Other recommended package of practices was followed as per the PAU package (PAU, 2015). The crop was irrigated as and when required. The crop was planted during first week of March and harvested last week of September. The soil of experimental area was sandy loam with pH 7.4, low organic matter (0.5%) and nitrogen (216 kg ha^{-1}), while it was medium in phosphorous (18.3 kg ha^{-1}) and potassium (155 kg ha^{-1}). The growth and yield observation data collected were subjected to analysis of variance (ANOVA) using GenStat software. Comparison of treatment means for significance at 5% was done using the critical difference (CD) method.

The different weight of planting material/ cormel in taro had significant effect on plant growth (Table 1). Growth attributes like petiole length, leaf polar and equatorial length and plant height increased with increasing seed cormel weight. Maximum petiole length was observed with seed cormel weight >75 g and it was followed by 60.75 g cormel weight. The lowest petiole length was observed with <30 g seed cormel weight. Similar trend was observed in leaf polar and equatorial diameter. However leaf polar diameter was more than leaf equatorial diameter. This may be a varietal character. Significantly taller plants were noticed when larger weight seed cormel (>75 g) was planted. The second best was with the seed cormel weight of 60-75 g. The shortest plants were with<30 g seed cormel weight. Larger weight seed cormels, probably initiate early sprouting and also due to higher reserve food materials, the plants are robust compared to lower weight seed cormels. Sikder et al. (2014) also reported similar findings and recorded significant effect of weight of planting material in taro on plant height and number leaves per plant. The response of plant height to planting material size/ weight in taro is also reported by Misra et al. (2005). In tuber crops, plant height is enhanced with increasing seed size/ weight. The potential reason behind it might be due to the availability

Table 1. Effect of weight of seed cormel on growth characters of taro

Weight of seed cormel (g)	Petiole length (cm)		Leaf polar diameter (cm)		Leaf equatorial diameter (cm)		Plant height (cm)	
	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
>75	32.5	32.8	26.3	28	22.5	23.5	81.3	82.5
60-75	29	28.8	24.8	23.8	20.3	19.8	71.3	70.5
45-60	22	21.3	22.5	22.3	18.3	17.3	44.3	45
30-45	14.5	14	20.5	20	15.3	14.4	39.3	35
<30	9.5	9	14.3	13.3	9.5	9	29.8	28.8
CD (0.05)	2.7	3.1	1.6	1.8	1.5	1.9	5.2	6.3

of more reserve food for growth in large corms which may help for larger growth (Gebre et al*.,* 2015).

Likewise plant growth parameters, yield and yield attributing traits also significantly influenced by weight of planting material in taro (Table 2). Significantly higher number of cormels per plant was noticed with seed cormel weight of >75 g and it was statistically comparable with 60-75 g. Furthermore, the number of cormels per plant harvested from seed cormel weight of 45-60 g was statistically at par with 60-75 g treatment. The minimum number of cormels per plant was obtained from <30 g seed cormel weight. The average cormel weight produced by seed cormel weight of >75 was significantly higher than other treatments. Similarly, the average cormel weight resulted from seed cormel weight of 60-75 g was statistically comparable with 45-60 and significantly higher than 30-45 and <30 g seed cormel weights. The maximum cormel yield per plant resulted from using seed cormel weight of >75 g and it was followed by seed cormel weight of 60-75 g. Further decreasing the seed cormel weight decreased the cormel yield per plant. The lowest cormel yield per plant was recorded with seed cormel weight of <30 g. The results trend was in agreement with the result of Gebre et al. (2015). Marked variation in corm yield per ha was observed. Significantly higher corm yield per ha was noticed with seed corm weight of >75 g. It was 15.9, 40.1, 88.0 and 188.0% higher cormel yield per ha than seed cormel weight of 60-75, 45-60, 30-45 and <30 g, respectively. The reasons for the higher cormel yield per ha might be due to larger cormel seed weights having more reserve food that principally led to taller plants, early canopy closure and maximum leaf area which helps to produce more biomass and yield (Gebre et al*.,* 2015). Significantly lower cormel yield per ha was noticed with the seed cormel weight of <30 g.

The results of the present study clearly indicated that larger weight seed cormels were required for greater growth and yield of taro.

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Table 2. Effect of weight of seed cormel on yield attributes and yield of taro

Weight of seed cormel (g)	No. of cormel $plant^{-1}$		Average cormel weight (g)		Cormel yield $plant^{-1}$ (g)		Cormel yield (t ha^{-1})	
	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13	2011-12	2012-13
>75	11.2	11	50.3	51.7	563.8	568.8	31.2	31.6
60-75	10.5	10.8	46.8	45.1	491.3	487.5	27.3	27
45-60	9.3	9	44.2	44	411	396.3	22.8	22
30-45	7.5	7.3	40.8	40.5	306.3	295.5	17	16.5
<30	6.5	6.3	30.6	31	198.8	195	11	10.8
CD (0.05)	1.2	1.4	2.1	2.2	22.4	24.3	2.1	2.2

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[1]Department of Vegetable Science, Punjab Agricultural University, Ludhiana 141 004

[2]Regional Centre of ICAR-Central Tuber Crops Research Institute, , Bhubaneswar 751 019

Corresponding author : M. Nedunchezhiyan

email: mnedun@gmail.com

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Hira Singh[1]
D.S. Khurana[1]
M. Nedunchezhiyan[2]
A. Mukherjee[2]