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Studies on the effect of times of patch budding in Aonla

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Abstract

The present experiment was carried out at Fruit Research Station, Kuthulia, College of Agriculture, Rewa (M.P.) during 2008-09. The investigation was carried out on ten treatments i.e., 21st September, 01st October, 11th October, 21st October, 01st November, 11th November, 21st November, 01st April, 11th April and 21st April in a randomized block design with four replications. The results showed that the maximum bud sprouting percentage (69.25 %), survival percentage (64.50 %), bud take success percentage (58.75 %), leaf chlorophyll content (5.65), shoot length, shoot diameter and number of leaves per sprouted shoot were recorded in the month of 21st April. However, maximum time taken for bud sprouting (30.75 days) was found in 21st November. Whereas, minimum bud sprouting percentage (24.75 %), survival percentage (22.50 %), bud take success percentage (14.25 %), shoot length, shoot diameter and number of leaves per sprouted shoot were recorded in the month of 21st November. However, minimum time taken for bud sprouting was found in 21st April and leaf chlorophyll content (3.04) in 1st November. The results reveal that date of budding 21st April was significant superior to all other date of budding. However shoot length per sprout at 90 days after operation, shoot diameter per sprout at 15, 45, 60 and 90 days after operation and number of leaves sprouted shoot at 60, 75 and 90 days after operation were non- significant. The patch budding given best suitable period obtained from the month 11th April to 21st April.

Key words: *Aonla, patch budding, time of propagation*

Introduction

Aonla (*Emblica officinalis* Gaertn.), belonging to the family Euphorbiaceae, is also known as Indian Gooseberry is a minor sub tropical deciduous tree indigenous to Indian sub-continent. This is a minor sub-tropical deciduous indigenous tree of Indian sub-continent. It can be grown successfully in dry and neglected region owing to its hardy nature, suitability to various kinds of wasteland. A mature aonla tree can tolerate freezing as well as high temperature of 46^0 C. In Madhya Pradesh it is potentially cultivated in Dewas, Seoni, Tikamgarh, Betul, Shivpuri, Panna, Rewa, Satna district etc. Aonla is propagated through seed as well as vegetative method. Among vegetative methods, patch budding, wedge and veneer grafting are widely employed in aonla. Upright growth habit of tree limits availability of scion shoots at convenient height and hence budding is more preferred commercially. It is propagated through patch/ modified ring budding in north India during mid May to September with 60-100 % success. Considering the efficiency and requirements of single bud, budding is an ideal method of propagation. Limited systematic work on this important aspect has yet been done in different region of Madhya Pradesh looking to the importance the vegetative propagation, different date of budding were taken to find out the best time of operation to get maximum success and survival.

Material and Methods

The present experiment was carried out at Fruit Research Station, Kuthulia, College of Agriculture, Rewa (M.P.) under Jawaharlal Nehru Krishi Vishwa Vidyalaya, Jabalpur (M.P.) during 2008-09. Rewa is situated in the North- Eastern part of Madhya Pradesh at latitude 24.31'N', longitude 81.5'E' and altitude of 365.7 meters above the mean sea level. The climate of Rewa region is semi arid and sub-tropical having hot and dry summer followed by rainy season and cold winter. In general, the highest and lowest rainfall reaches above 900 mm to 1150 mm. the rainfall is observed mainly from July to September and sometimes winter showers are also received. The investigation was carried out on ten treatments i.e., 21st September, 01st October, 11th October, 21st October, 01st November, 11th November, 21st November, 01st April, 11th April and 21st April. The experiment was arranged in a randomized block design with four replications. The aonla seed were sown in well manured nursery. After germination the seedling were lifted out carefully and shifted in the final nursery beds and planted in the month of September, 2007. The seedlings were properly maintained in the nursery beds up to July, 2008. The seedlings were selected and operated as per treatment in the year 2008. The NA-7 variety of aonla was chosen as bud stick for budding. Observation were recorded on growth characters i.e., bud sprouting %, survival %, bud take success %, time taken for bud sprouting (days), leaf chlorophyll content, shoot length (cm), shoot diameter (cm) and number of leaves per shoot from twenty randomly selected plants in each plot. Sprouting of bud-scions were observed everyday and number of days taken for sprouting was counted back to date of budding. Survival percentage of sprouted buds was calculated for each replication of buds sprouted out of total number of buds prepared. The chlorophyll content of leaf

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was measured with the help of chlorophyll meter. The per cent data were angularly transformed before statistical analysis and both original as well as transformed values are presented. The final data of each characters recorded during the investigation were analysis statistically by the method of "Analysis of variance".

Results and Discussion

The results reveal that date of budding 21st April was significantly superior to all other date of budding. The data presented in (Table 1) indicate that maximum bud sprouting was found in the month of 21st April (69.25 %), which was *at par* 11th April (63.75 %), 1st April (60.00 %) and 21st September (55.00 %), whereas minimum bud sprouting were recorded in 21st November (24.75 %), which was *at par* with the month of 11th November (28.25 %), 1st November (33.75 %) and 21st October (39.25 %). However, the differences amongst the treatment were significant. The higher percentage of bud sprouting obtained in 21st April date of budding may be due to the favourable weather condition during this sprouting period the temperature was average and humidity was high and the weather was cloudy. These results are in conformity with the finding of Pathak *et al.,* (1991) who reported that at 15 days intervals from 1st April to 15th September were studied. The highest bud sprouting (83.3 %) and highest bud survival (73.02 %). The present findings have also been supported by Wagh *et al.*, (2001), Prasad *et al.*, (2003) and Singh *et al.*, (2003).

The data presented in (Table 1) indicate that maximum survival percentage were recorded in the month of 21st April (64.50 %), which was *at par* with 11th April (60.00 %), 1st April (56.25 %) and 21st September (50.00 %), whereas minimum survival percentage were found in 21st November (22.50 %), which *at par* with 11th November (25.00 %), 1st November (30.00 %) and 21st October (35.00 %). However, the differences amongst the treatments were significant. The increase in survival of budded plants seem to be due to meteorological factors especially mid temperature and high relative humidity on 21st April as compared to 21st September and 11th April. Mid temperature and high relative humidity might have reduced the desiccation of tissues and facilitates faster cell division. These results are in conformity with finding of Rai *et al.*, (1999) higher percentage of survival was recorded with patch budding performed on 30th June in 'Pant Apna' and patch budding on 8th July in 'Pant Shivani'. The similar results were reported by Shrivastava *et al.*, (2002), Prasad *et al.*, (2003) and Negi *et al.*, (2010).

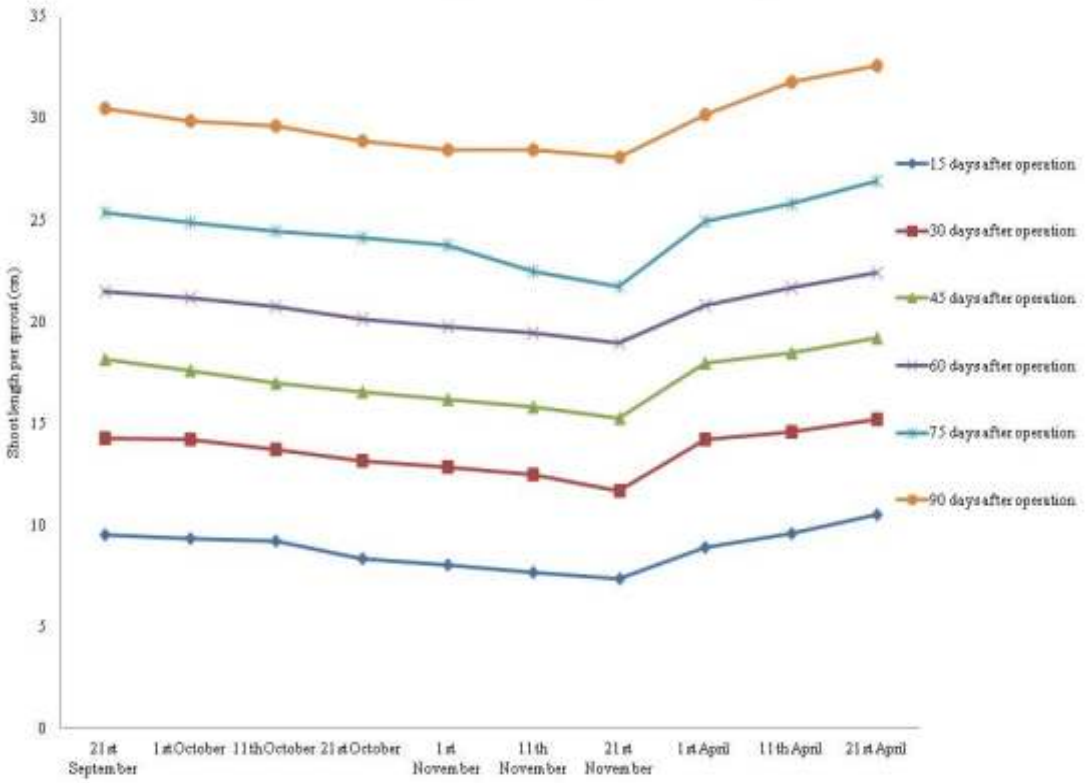
. The data presented in (Table 1) indicate that maximum percentage of bud take success were found in the month of 21st April (58.75 %), which was *at par* with 11th April (52.50 %), 1st April (50.00 %) and 21st September (45.00 %), whereas minimum percentage of bud take success were recorded in 21st November (14.25 %), which was *at par* with the month of 11th November (22.50 %), 1st November (25.00 %) and 21st October (30.00 %). However, the differences the treatments were significant. These results are in conformity with the finding of Upadhyay and Prasad (1988) they found that in patch budding the success was highest in July (85 %) followed by August and September, each with (80 %). The present findings have also been supported by Singh and Parmar (1998), Shalini *et al.,* (2000), Prasad *et al.,* (2003), Patil (2004) and Negi *et al.,* (2010).

The data on time taken for bud sprouting (Table 1) showed that maximum time taken for bud sprouting were recorded in the month of 21st November (30.75 days), which was *at par* with 11th November (28 days), 1st November (27.50 days) and 21st October (24.25 days), whereas minimum time taken for bud sprouting was found in 21st April (14.75 %), which was *at par* with the month of 11th April (15.50 days), 1st April (17.75 days) and 21st September (17.50 days). However, the differences the treatments were significant. These finding were conformed to findings of Kumar *et al.,* (2004) sprouting was earliest (20.6 days) in the plant budding during the September. The similar results were reported by Negi *et al.,* (2010).

The data on leaf chlorophyll content (Table 1) showed that the maximum leaf chlorophyll content were found in the month of 21st April (5.65), which was *at par* with 11th April (5.60), 21st September (5.45) and 1st October (5.42), whereas minimum leaf chlorophyll content were recorded in 1st November (3.04), which was *at par* with the month of 21st November (3.80), 21st October (3.82) and 11th October (4.63). However, the differences the treatments were significant. The similar results were reported by Prasad *et al.,* (2003)

The data presented in (Fig.1) indicate that the maximum shoot length per sprout at 15th days after operation was found in the month of 21st April (10.50 cm), which was *at par* with 11th April (9.60 cm), whereas minimum shoot length per sprout at 15th days after operation was recorded in 21st November (7.34 cm), which was *at par* with the month of 11th November (7.70 cm). However, the differences amongst the treatments were significant. The maximum shoot length per sprout at 30th days after operation was found in the month of 21st April (15.20 cm), which was *at par* with 11th April (14.60 cm), whereas minimum shoot length per sprout at 30th days after operation was recorded in 21st November (11.68 cm), which was *at par* with the month of 11th November (12.46 cm). However, the differences amongst the treatments were significant. The maximum shoot length per sprout at 45th days after operation was found in the month of 21st April (19.20 cm), which was *at par* with 11th April (18.49 cm), whereas minimum shoot length per sprout at 45th days after operation was recorded in 21st November (15.24 cm), which was *at par* with the month of 11th November (15.80 cm). However, the differences amongst the treatments were significant. The maximum shoot length per sprout at 60th days after operation was found in the month of 21st April (22.40 cm), which was *at par* with 11th April (21.65 cm), whereas minimum shoot length per sprout at 60th days after operation was recorded in 21st November (18.94 cm), which was *at par* with the month of 11th November (19.48 cm). However, the differences amongst the treatments were significant. The maximum shoot length per sprout at 75th days after operation was found in the month of 21st April (26.90 cm), which was *at par* with 11th April (25.80 cm), whereas minimum shoot length per sprout at 75th days after operation was recorded in 21st November (21.73 cm), which was *at*

Fig. 1: Effect of different date of patch budding on shoot length (cm) at 15th day's interval



par with the month of 11th November (22.45 cm). However, the differences amongst the treatments were significant. The maximum shoot length per sprout at 90th days after operation was found in the month of 21st April (32.60 cm), which was *at par* with 11th April (31.80 cm), whereas minimum shoot length per sprout at 90th days after operation was recorded in 21st November (28.10 cm), which was *at par* with the month of 1st November (28.43 cm). However, the differences amongst the treatments were non-significant. The maximum shoot length of sprout obtained in 21st April budding may be due to earlier bud sprouting and survival. The present findings have also been supported by Rajamanickam *et al.*, (2002) and Kour and Singh (2009).

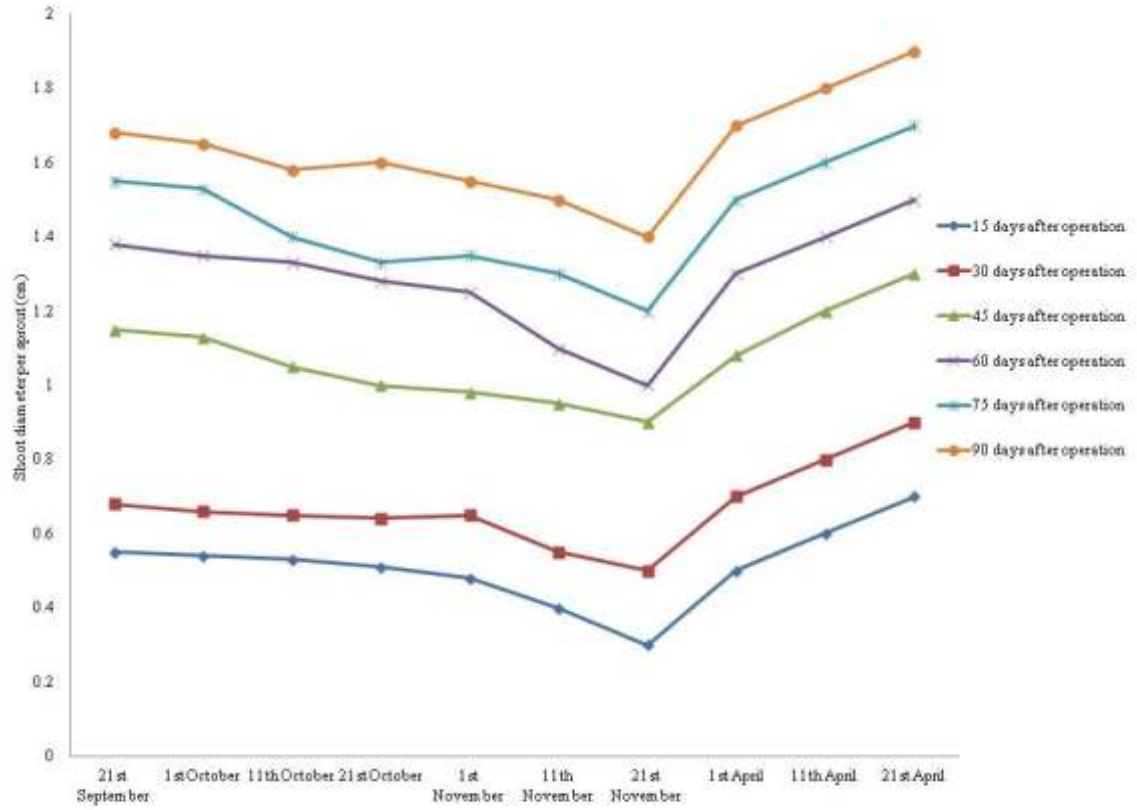
The data presented in (Fig. 2) indicate that the maximum shoot diameter per sprout at 15th days after operation was recorded in the month of 21st April (0.70 cm), which was *at par* with 11th April (0.60 cm), whereas minimum shoot diameter per sprout at 15th days after operation was found in 21st November (0.30 cm), which was *at par* with the month of 11th November (0.40 cm). However, the differences amongst the treatments were non-significant. The maximum shoot diameter per sprout at 30th days after operation was recorded in the month of 21st April (0.90 cm), which was *at par* with 11th April (0.80 cm), whereas minimum shoot diameter per sprout at 30th days after operation was found in 21st November (0.50 cm), which was *at par* with the month of 11th November (0.55 cm). However, the differences amongst the treatments were significant. The maximum shoot diameter per sprout at 45th days after operation was recorded in the month of 21st April (1.30 cm), which was *at par* with 11th April (1.20 cm), whereas minimum shoot diameter per sprout at 45th days after operation was found in 21st November (0.90 cm), which was *at par* with the month of 11th November (0.95 cm). However, the differences amongst the treatments were non-significant. The maximum shoot diameter per sprout at 60th days after operation was recorded in the month of 21st April (1.50 cm), which was *at par* with 11th April (1.40 cm), whereas minimum shoot diameter per sprout at 60th days after operation was found in 21st November (1.00 cm), which was *at par* with the month of 11th November (1.10 cm). However, the differences amongst the treatments were non-significant. The maximum shoot diameter per sprout at 75th days after operation was recorded in the month of 21st April (1.70 cm), which was *at par* with 11th April (1.60 cm), whereas minimum shoot diameter per sprout at 75th days after operation was found in 21st November (1.20 cm), which was *at par* with the month of 11th November (1.30 cm). However, the differences amongst the treatments were significant. The maximum shoot diameter per sprout at 90th days after operation was recorded in the month of 21st April (1.90 cm), which was *at par* with 11th April (1.80 cm), whereas minimum shoot diameter per sprout at 90th days after operation was found in 21st November (1.40 cm), which was *at par* with the month of 11th November (1.50 cm). However, the differences amongst the treatments were significant. It may be due to earlier sprouting and rapid growth of shoot. The similar results were reported by Rajamanickam *et al.*, (2002) and Kour and Singh (2009).

The data presented in (Fig. 3) indicate that the maximum number of leaves per sprouted shoot at 15th days after operation was recorded in the month of 21st April (7.54), which was *at par* with 11th April (7.42), whereas minimum diameter of per sprouted shoot at 15th days after operation was found in 21st November (6.10), which was *at*

Table 1. Effect of different date of patch budding on bud sprouting percentage, survival percentage, bud take success percentage, time taken for bud sprouting and leaf chlorophyll content.

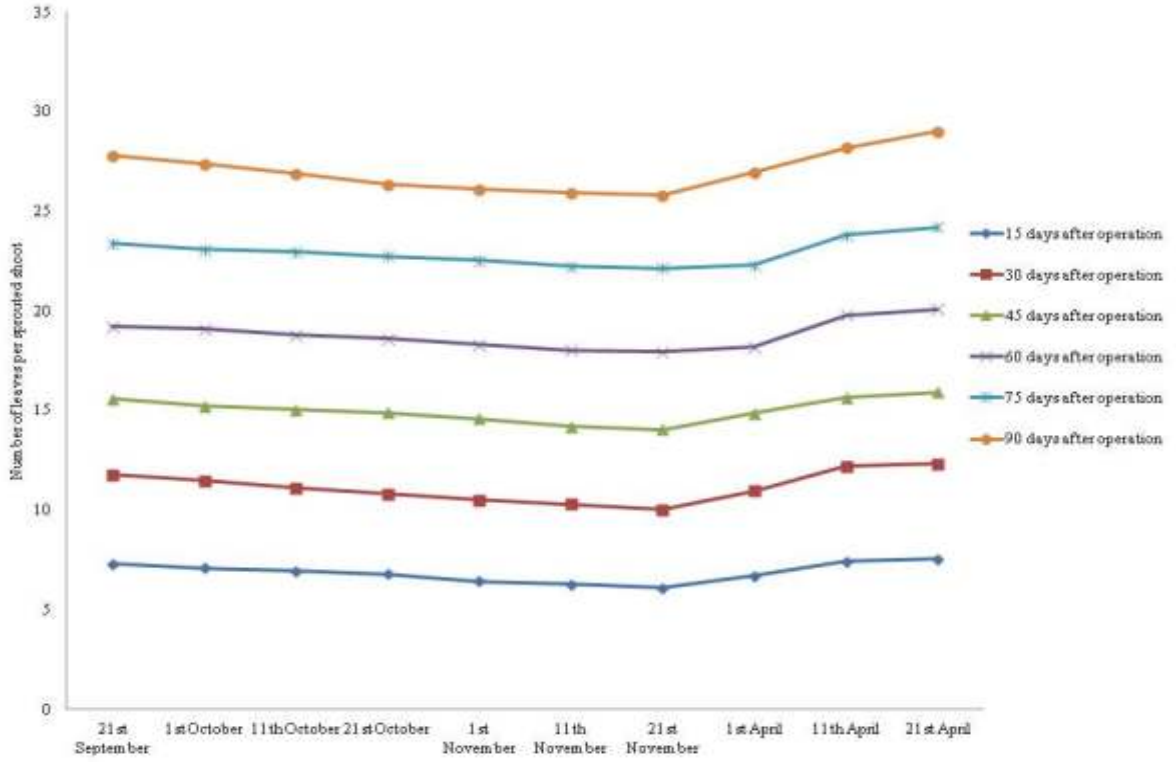
Treatment	Bud sprouting Percentage	Survival percentage	Bud take success percentage	Time taken for bud sprouting (days)	Leaf chlorophyll content
21st September	55.00	50.00	45.00	19.50	5.45
1st October	48.75	44.75	41.75	22.00	5.42
11th October	44.25	40.00	35.00	22.25	4.63
21st October	39.25	35.00	30.00	24.25	3.82
1st November	33.75	30.00	25.00	27.50	3.04
11th November	28.25	25.00	22.50	28.00	4.20
21st November	24.75	22.50	14.25	30.75	3.80
1st April	60.00	56.25	50.00	17.75	4.90
11th April	63.75	60.00	52.50	15.50	5.60
21st April	69.25	64.50	58.75	14.75	5.65
S. Em+	2.28	2.29	1.99	0.90	0.41
CD (5%)	6.62	6.65	5.79	2.62	1.21

Fig. 2: Effect of different date of patch budding on shoot diameter (cm) at 15th day's interval



par with the month of 11th November (6.30). However, the differences amongst the treatments were significant. The maximum number of leaves per sprouted shoot at 30th days after operation was recorded in the month of 21st April (12.31), which was *at par* with 11th April (12.22), whereas minimum diameter of per sprouted shoot at 30th days after operation was found in 21st November (10.05), which was *at par* with the month of 11th November (10.30). However, the differences amongst the treatments were significant. The maximum number of leaves per sprouted shoot at 45th days after operation was recorded in the month of 21st April (15.92), which was *at par* with 11th April (15.66), whereas minimum diameter of per sprouted shoot at 45th days after operation was found in 21st November (14.05), which was *at par* with the month of 11th November (14.20). However, the differences amongst the treatments were significant. The maximum number of leaves per sprouted shoot at 60th days after operation was recorded in the month of 21st April (20.10), which was *at par* with 11th April (19.80), whereas minimum diameter of per sprouted shoot at 60th days after operation was found in 21st November (17.95), which was *at par* with the month of 11th November (18.05). However, the differences amongst the treatments were non-significant. The maximum number of leaves per sprouted shoot at 75th days after operation was recorded in the month of 21st April (24.20), which was *at par* with 11th April (23.80), whereas minimum diameter of per sprouted shoot at 75th days after operation was found in 21st November (22.15), which was *at par* with the month of 11th November (22.25). However, the differences amongst the treatments were non-significant. The maximum number of leaves per sprouted shoot at 90th days after operation was recorded in

Fig. 3: Effect of different date of patch budding on number of leaves per sprouted shoot at 15th day's interval



the month of 21st April (29.00), which was *at par* with 11th April (28.20), whereas minimum diameter of per sprouted shoot at 90th days after operation was found in 21st November (25.80), which was *at par* with the month of 11th November (25.95). However, the differences amongst the treatments were significant. However, the differences amongst the treatments were non-significant. The maximum number of leaves per sprout obtained in 21st April budding may be due to earlier bud sprouting and survival. The probable reason may be due to the earlier sprouting and better growth of the scion shoot. The present findings have also been supported by Rajamanickam *et al.*, (2002) and Kour and Singh (2009).

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