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Konkan Kasturi: An enriched variety of coriander (*Coriandrum sativum* L.) with good yield and aroma

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Abstract

Coriander (*Coriandrum sativum* L.) is the most important crop among the seed spices with a pleasant aroma mainly cultivated for its tender green leaves, stem, and dry seeds. Its green foliage is rich in vitamins, proteins, and other minerals. The tender leaves and stem have a characteristic aroma used for flavoring and garnishing curried dishes of all sorts, soups, sauces, chutneys, etc. By considering the importance and demand of coriander in the region, six cultivars had evaluated for yield and quality parameters at Vegetable Improvement Scheme, Central Experiment Station, Wakavali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli. Among the evaluated types, DPL COR- 1 (Konkan Kasturi) recorded a maximum herbage yield (106.42 q/ha) that was significantly superior to the other types. The leaves of Konkan Kasturi are broad, attractive dark green with reddish tinged petiole and grows up to the height of 35 to 45 cm. It is having an average of 39 leaves per plant and 6 to 7 branches. This variety of coriander contains an excellent aroma (*Aldehyde Mandrin*- 48900 ppm) which is five to six times greater than other types. It has also recorded early maturity (35 days) with spreading type growth habit, good shelf life (3-4 days). Besides this, no incidence of pests and diseases was observed during the experiment.

Keywords: *Coriandrum sativum*, Konkan Kasturi, Aroma, Herbage yield, *Aldehyde Mandrin*, Shelf life

1. Introduction

Coriander (*Coriandrum sativum* L.) is a popular leafy vegetable belonging to the Apiaceae family and is primarily grown from its seeds throughout the year (Mhemdi *et al.*, 2011) [7]. It is grown primarily for tender green leaves and stems, as well as for its ripe fruits (Shavandi *et al.*, 2012) [11]. It is also grown in kitchen gardens in the konkan region of Maharashtra (India). Fresh coriander leaves are also known as cilantro, and it looks a lot like Italian flat-leaf parsley (*Eryngium foetidum*) (Sharma & Sharma, 2012) [10]. Moreover, coriander is grown on a large scale commercial or as an intercrop in other crops in several parts of Maharashtra and the rest of India. It is an annual herbaceous plant with medicinal properties that originated in the Mediterranean and Middle Eastern regions. It contains a small amount of essential oil (0.03 to 2.6%). Coriander essential oil is extracted by steam distilling dried fully ripe fruits (seeds), and it has a moderate, sweet, moist, aromatic flavour and a linalool-like odour (Cadwallader *et al.*, 2005) [3].

Coriander is regarded as one of the world's most valuable spices and plays a significant role in international trade. Today, this herb is grown all over the world for its fruit, as a spice, or for the production of essential oil and fatty acids, and its stem leaves and fruits, which have a pungent aromatic quality, are commonly used as a condiment or spice in the Mediterranean (Starkenmann *et al.*, 2006) [12]. Coriander contains 87.9 percent moisture, 3.3 percent protein, 6.5 percent carbohydrates, 1.7 percent total ash, 0.14 percent calcium, 0.06 percent phosphorus, 0.01 percent iron, 60 mg/100 g vitamin B2, 0.8 mg/100 g niacin, 135 mg/100 g vitamin C, and 10,460 International unit (IU)/100 g vitamin A. Coriander seed comprises approximately 11 g of starch, 20 g of fat, and 11 g of protein per 100 g (Peter, 2004) [9]. Fresh leaves are consumed for various health benefits, but if not harvested fresh, seeds mature and ripen in late summer, producing a delicate aroma which is used as a dried spice (Bhat *et al.*, 2014) [2]. Besides, this herb is used to treat various illnesses such as stomach problems, respiratory problems, and urinary tract infections. Coriander has a wide range of pharmacological properties, such as antioxidant (Darughe *et al.*, 2012) [5], anti-diabetic (Eidi *et al.*, 2012) [6], anti-mutagenic (Cortes *et al.*, 2004) [4], anti-lipidemic (Sunil *et al.*, 2012) [13], and anti-spasmodic (Alison *et al.*, 1999) [1].

Coriander is a tropical seasonal herb that thrives best in dry climates, but it can flourish in various soil types, including light, well-drained, moist, loamy soil, and light to heavy black

soil (Verma *et al.*, 2011) [14]. High yield potential, leaves, and stems with strong aroma are important characters for its cultivation. Currently, the majority of genotypes are upright with non-fragrance leaves, making them unsuitable for commercial vegetable cultivation. Therefore, it is thought that a high-yielding and spreading form with a strong aroma character is needed for vegetable purposes. On this background, efforts were made to find out a suitable variety of coriander with desirable characters suitable for the konkan agro-climatic conditions of Maharashtra (India).

2. Materials and Methods

DPL-COR-1 is developed through selection method at Central Experiment Station (CES), Wakavali, Maharashtra (India) by selecting various local genotypes and the elite types collected from Dapoli Tehsil, District Ratnagiri, India. Furthermore, the experimental material for the present study comprised of 6 coriander varieties obtained from different institutions (Annexure 1) and were tested for growth and yield attributes during 2008 to 2011 at Vegetable Improvement Scheme (VIS), Central Experiment Station (CES), Wakavali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth (DBSKKV), Tal. Dapoli, Dist: Ratnagiri of Maharashtra. The experiment was designed using Randomized Block Design (RBD) with four replications and treatments assigned randomly in each replication. During bed preparation, 15 tonnes of farmyard manure (FYM), a full dose of phosphorus and potassium, and a half dose of nitrogen (60:60:30 kg NPK/ha) were applied. Coriander seeds were planted at 30 cm line spacing (a shallow depth of 1-1.5cm) and germinated in 10 days. Five plants from each variety were chosen randomly and tagged to record observations for plant characteristics and yield attributes. Plant height (cm), number of leaves per plant, number of branches per plant, growth habit, herbage yield per hectare (q), disease and pest incidence, moisture content, oil yield (fresh wt.), oil yield (dry wt.), and Aldehyde mandarin were all recorded regularly. Data was analyzed for different parameters by a method suggested by Panse and Sukathme 1961 [8].

Table 1: List of coriander varieties evaluated in the study

Sr. No.	Varieties	Source
1.	DPL-COR-1	Dapoli
2.	Co-2 (C)	Coimbatore
3.	DPL-COR-2	Dapoli
4.	UD-684	Jobner
5.	UD-686	Jobner
6.	DPL-Local	Dapoli

3. Results and Discussion

3.1 Performance characteristics

3.1.1 Varietal characteristics

DPL-COR-1 (Konkan Kasturi) has a spreading type of growth habit with broad leaves. The upper surface of the leaves is attractive, dark green in colour with reddish tinged petiole and multifold leaf margin. The height of plant is upto 35 cm and

bears a high yield (106 qha⁻¹) along with good aroma (Aldehyde mandarin marker compound responsible for fragrance). Also, the coriander DPL-COR-1 has good shelf life (3-4 days) at ambient temperature (27-32° C). This cultivar is suitable for growing in Rabi as well as Kharif season in konkan region of Maharashtra (India).

3.1.2 Yield evaluation

From the mentioned six genotypes, DPL-COR-1 was a prominent high yielding variety (104.64 q ha⁻¹) during 2008-2011, whereas, Co-2 was a low yielding variety (61.96 q ha⁻¹) (Table 2). Moreover, these genotypes were evaluated at six different places: Dapoli, Palghar, Awashi, Phondaghat, Karjat, and Wakavali as MLT for the yield performance (Table 3). DPL-COR-1 was recorded as a high-yielding variety at all places. Although the six genotypes were studied at a different location in the Konkan region, only two genotypes (DPL-COR-1 and DPL-Local) were selected to evaluate at farmer's fields in Thane, Raigad, Ratnagiri, and Sindhudurg districts of Maharashtra during the year 2012-2013. DPL-COR-1 was a notable high-yielding variety, yielding 15.81 t ha⁻¹ in 2013, while DPL-Local yielded 9.32 t ha⁻¹.

3.1.3 Plant height, number of leaves and number of branches per plant

Among the growth attributes, the plant height was maximum in DPL-COR-1 (35.85 cm) while it was minimum in Co-2(C) (29.92 cm) at different locations (Table 5). Besides, the maximum number of leaves per plant was recorded in DPL-COR-1 (39.02) and was minimum in UD-684 (29.58) (Table 6). Moreover, the number of branches per plant was maximum in DPL-COR-1 (6.36) whereas, it was minimum in Co-2 (C) (5.65).

3.2 Quality attributes

The mentioned genotypes of coriander were studied for the quality characters. Among the studied quality characters, the variety DPL-COR-1 recorded a high concentration of Aldehyde Mandarin (48900 ppm) PIC principal marker compound responsible for the fragrance, which is five times more than the other varieties. The moisture percent of DPL-COR-1 is 84.9% which is higher than the DPL-Local 77.2%. Furthermore, the oil yield by fresh weight is 0.02%, and the oil yield for dry weight is 0.126% (Table 7).

Notification and seed production

Konkan Kasturi (DPL-COR-1) a variety of coriander, was released and notified by the central sub-committee on crop standards, notification, and release of varieties vide notification in the official gazette number S.O.4272 (E), dated 26th of November, 2019. The Central Experiment Station, Wakavali, Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli is the maintainer of this variety and the producer of the nucleus and breeder seeds of coriander.

Table 1: Yield (q/ha) of coriander varieties at VIS, CES, Wakawali (Pooled data)

Sr. No.	Varieties	Average yield (q/ha)			Pooled mean (q/ha)
		2008-09	2009-10	2010-11	
1.	DPL-COR-1	97.42	113.60	102.90	104.64
2.	Co-2 (C)	56.67	63.42	65.80	61.96
3.	DPL-COR-2	74.50	80.32	73.82	76.21
4.	UD-684	86.44	76.84	75.90	79.72
5.	UD-686	82.34	77.60	80.20	80.04
6.	DPL-Local	88.60	92.67	93.70	91.65
SE ±		3.31	5.11	4.68	4.83
CD @ 5%		9.87	15.29	14.04	14.51

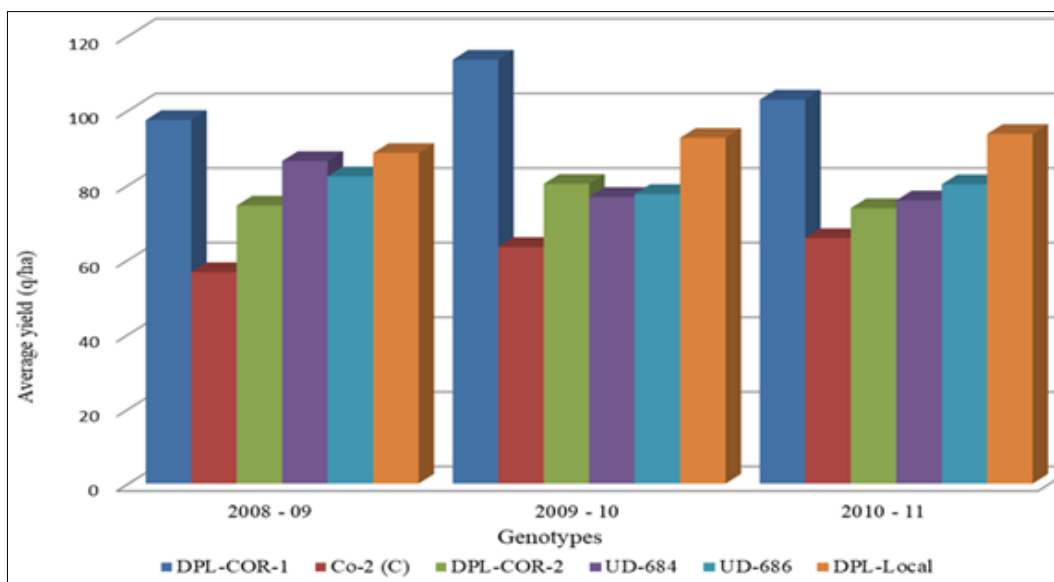


Fig 1: Yield (q/ha) of coriander varieties at VIS, CES, wakawali

Table 2: Pooled mean green yield (q/ha) of coriander varieties at different locations (2010 - 11)

Sr. No.	Varieties	Dapoli	Palghar	Awashi	Phondaghat	Karjat	Wakawali	Pooled Mean
1.	DPL-COR-1	104.62	106.20	99.36	113.51	114.18	100.70	106.42
2.	Co-2 (C)	79.60	55.38	62.88	80.64	84.30	69.85	72.10
3.	DPL-COR-2	94.08	85.19	72.39	83.26	86.67	66.65	83.04
4.	UD-684	76.90	47.60	69.30	78.92	87.68	49.75	68.35
5.	UD-686	103.10	96.00	90.67	98.40	91.08	88.30	94.59
6.	DPL-Local	98.42	96.50	84.18	92.58	99.72	85.80	92.86
SE ±								5.21
CD@5%								15.64

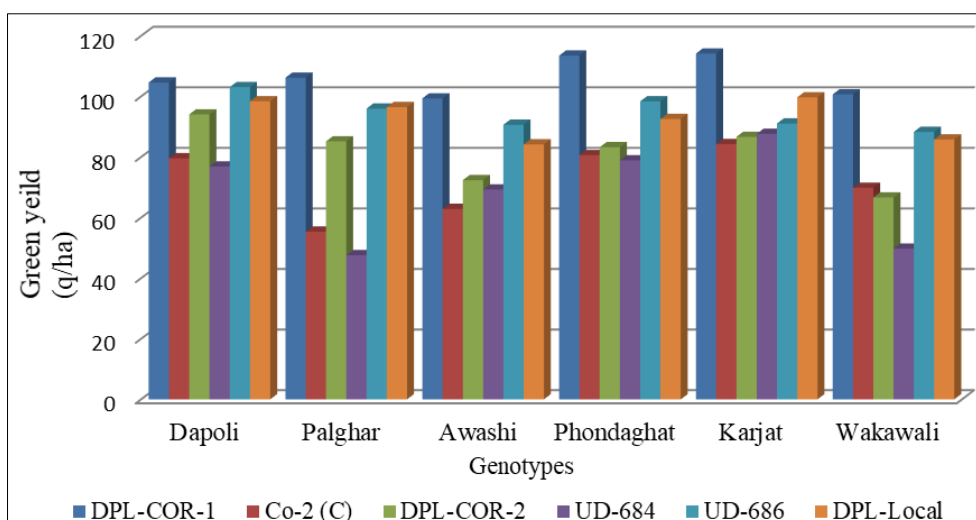


Fig 2: Pooled mean green yield (q/ha) of coriander varieties at different locations

Table 3: Plant height (cm) of coriander varieties at different locations (2010 - 11)

Sr. No.	Varieties	Palghar	Dapoli	Awashi	Phondaghat	Karjat	Wakawali	Mean
1.	DPL-COR-1	34.24	36.2	33.4	35.10	39.72	36.48	35.85
2.	Co-2 (C)	27.95	25.8	32.9	36.0	27.65	29.22	29.92
3.	DPL-COR-2	30.30	26.6	38.5	34.4	28.67	27.74	31.03
4.	UD-684	25.40	37.2	38.2	31.3	27.85	32.10	32.00
5.	UD-686	31.18	33.0	33.6	35.1	28.25	27.44	31.42
6.	DPL-Local	30.25	28.2	32.0	33.4	29.92	25.92	29.94
SE ±								0.87
CD @ 5%								2.59

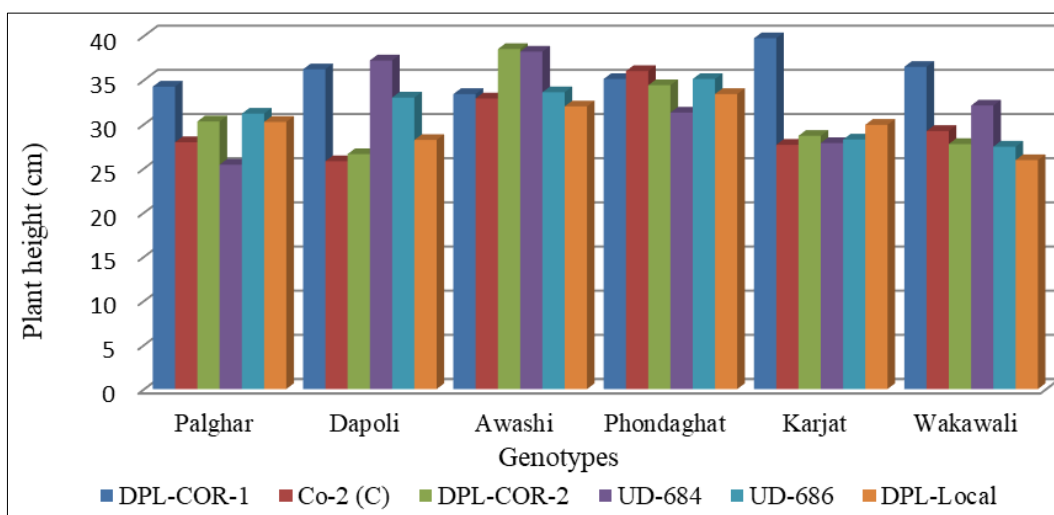


Fig 3: Plant height (cm) of coriander varieties at different locations

Table 4: Number of leaves per plant of coriander varieties at different locations (2010-11)

Sr. No.	Varieties	Palghar	Dapoli	Awashi	Phondaghat	Karjat	Wakawali	Mean
1.	DPL-COR-1	38.00	40.80	37.50	36.90	41.70	39.25	39.02
2.	Co-2 (C)	32.38	30.60	29.90	38.40	36.50	32.70	33.41
3.	DPL-COR-2	36.90	29.50	35.70	32.00	34.20	31.40	33.28
4.	UD-684	25.60	31.40	30.30	29.90	32.80	27.52	29.58
5.	UD-686	39.55	36.2	34.40	32.70	44.50	34.64	36.99
6.	DPL-Local	37.68	42.20	36.70	30.40	40.80	30.78	36.42
SE ±								2.13
CD @ 5%								6.37

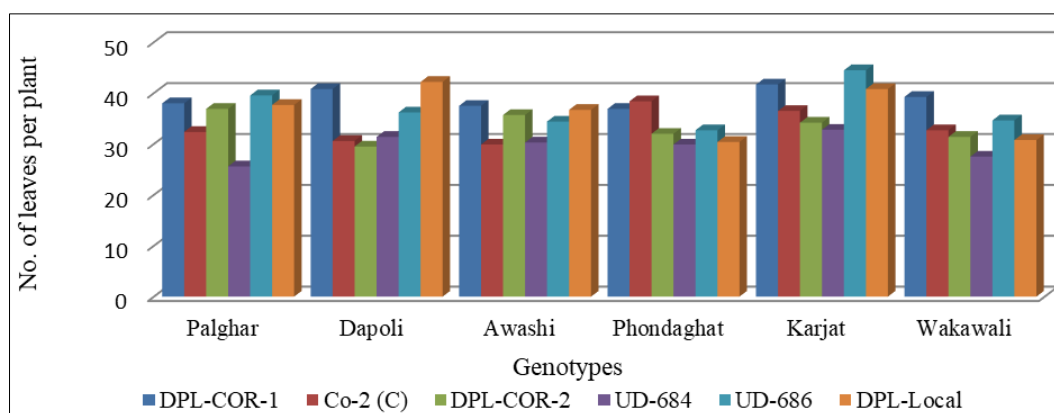


Fig 4: Number of leaves per plant of coriander varieties at different locations (2010-11)

Table 5: Number of branches/plant of coriander varieties at different locations (2010-11)

Sr. No.	Varieties	Palghar	Dapoli	Awashi	Phondaghat	Karjat	Wakawali	Mean
1.	DPL-COR-1	5.90	5.60	6.20	6.20	7.30	6.98	6.36
2.	Co-2 (C)	5.95	4.90	4.40	6.70	6.75	5.20	5.65
3.	DPL-COR-2	5.40	5.60	5.90	6.20	7.25	5.33	5.94
4.	UD-684	5.60	4.50	5.30	6.10	7.60	5.49	5.76
5.	UD-686	5.90	4.70	5.60	6.40	6.35	6.12	5.84
6.	DPL-Local	5.20	5.40	5.10	5.30	7.60	5.90	5.75
SE ±								0.034
CD @ 5%								0.102

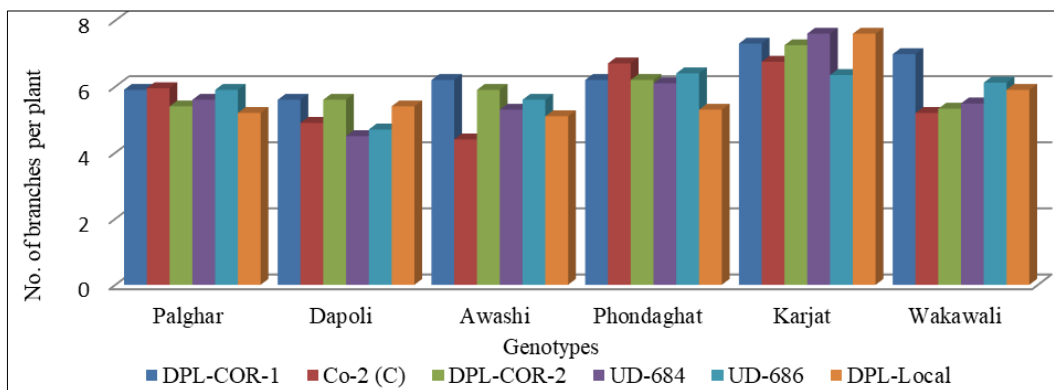


Fig 5: Number of branches per plant of coriander varieties at different locations (2010-11)

Table 6: Quality analysis of coriander leaves of different coriander varieties

Sr. No.	Quality parameters	Varieties					
		DPL-OR-1	Co-2 (C)	DPL-OR-2	UD-684	UD-686	DPL-Local
1.	Moisture (%)	84.9	75.9	82.6	65.3	85.9	77.2
2.	Oil yield (%) fresh wt.	0.02	0.058	0.426	0.0788	0.034	0.0073
3.	Oil yield (%) dry wt.	0.126	0.243	0.245	0.227	0.241	0.032
4.	Aldehyde Mandarin PIC principal responsible for fragrance (ppm)	48900	Not detected	Not detected	Not detected	8740	Not detected

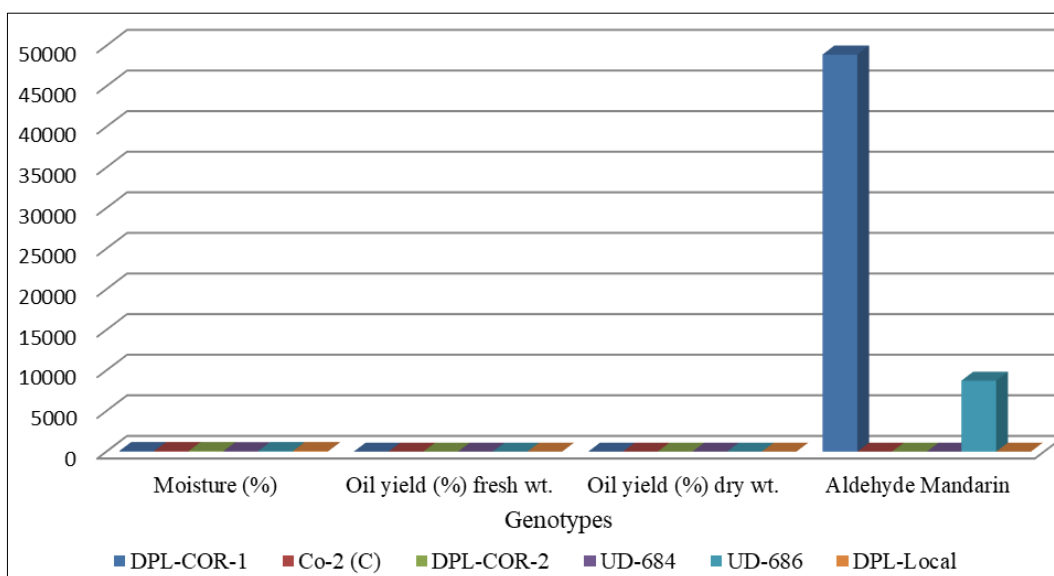


Fig 6: Quality analysis of coriander leaves of different coriander varieties

4. Conclusion

From the pooled data the genotype DPL-COR-1 produced the significantly highest green yield (106.42 q/ha) and recorded good aroma as compared to the rest of the genotypes under study.

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