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RESPONSE OF *Chasmanthe aethiopica* (L.) N.E.Br. PLANTS TO FOLIAR SPRAY WITH KINETIN AND KRISTALON

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ABSTRACT

Propagation of Antholyza (*Chasmanthe aethiopica* (L.) N.E Br.) by seeds, usually needs 3-4 years to get flowering plants, and may be accompanied with some genetical isolations. However, in order to keep the quality and colour of the cultivated species, it is preferable to use new corms or cormels in propagation. Increasing such new corms or cormels on the mother plant is considered the main target from the commercial point of view.

So, a field trial was carried out at Orman Botanical Garden, Giza, Egypt during 2005-06 and 2006/07 seasons to study the effect of kinetin (6-furfuryl aminopurine) at the levels of 0, 25, 50 and 75 ppm, kristalon (a complete fertilizer of 19:19:19 + micronutrients) at the rates of 0, 1, 2 and 3 g/L and the combination between 50ppm kinetin and 2 g/L kristalon on the vegetative growth, flowering, corms productivity and chemical composition of *Chasmanthe aethiopica* (L.) N.E. Br. Plants.

The obtained results indicated that all treatments, except for 1 and 3 g/L kristalon, improved plant height and fresh and dry weights of leaves, with the superiority of the combined treatment which significantly gave the longest plants and the heaviest fresh and dry weights. Number of leaves/plant, however was not affected by either treatments used in such study. The best flowering precocity and quality of spikes (assessed as flowering stalk length, No. florets/ spike and vase life) were found to be the best in case of the combined treatment, which also gave the highest number and best quality of cormels/ plant, the highest content of pigments in the leaves (specially chlorophylls a and b), the best balance between promoters (as indoles) and inhibitors (as phenols), as well as the percentage of total carbohydrates, N, P and K in the leaves and corms of treated plants.

Hence, it is recommended to spray the foliage of *Chasmanthe aethiopica* (L.) N.E. Br. plant till run off with the combination of 50ppm kinetin and 2 g/L kristalon after planting the corms by about 50 days, thrice with three weeks interval for best growth, flowering, corms productivity and chemical composition.

INTRODUCTION

Chasmanthe aethiopica (L.) N.E.Br. (formerly *Antholyza aethiopica* L.) as a winter cormous plant of the gladiolus kind belongs to Fam. Iridaceae, usually grown in the open borders and beds for its fancied shape of red-yellow floret, that likes when open the mouth of an angry monster. It is also used as a pot plant for exhibition, terrace garden, as well as display of verandah and sunny building faces. Its spikes with long stalks and dense florets may be used as cut flowers (Bailey, 1935 and Huxley *et al*., 1992).

Propagation of Antholyza by seeds, usually needs 3-4 years to get flowering plants, and may be accompined with some of genetical isolations. On the other hand, in order to keep the quality and colour of the cultivated species or progeny, it is preferable to use new corms or cormels in propagation. Increasing these new corms and cormels on the mother plant is commercially the main target of the production process. Such target,

however, may be achieved by using kinetin, as a cell – division promoter able to overcome the apical dominance of many plants and stimulate the lateral buds to develop into an entire new plant (Cheema and Sharma, 1982), and complete fertilizer, as a source of nutrients necessary for healthy growth (Mengel and Kirkby, 1979). In this regard, El-Bably (2003) found that fertilizing *Antholyza aethiopica* with 10g ammonium sulphate + 6 g Ca-superphosphate + 5g K- sulphate per plant gave the best growth, flowering and corms productivity. Auda (1992) on amaryllis, mentioned that the combination of 50 ppm kinetin + 4 g/L Fulifertile significantly increased No. leaves and their fresh and dry weights, improved flowering, No. bulblets / plant and chemical constituents in the leaves and bulbs. Likewise, Shahin (1998) indicated that the combined treatment of 50 ppm kinetin + 3 ml/L Greenzit gave best vegetative growth, flowering and more offsets in *Crinum longifolium* and *Hemerocallis aurantiaca* bulbous plants.

Similar findings were also gained by Khalafalla *et al*., (1995) on *Dahlia pinnata* Cav., El-Ashry *et al*., (1995) on *Hippeastrum vittatum* cv. "Apple Blossom", Singh (1996) and Barma *et al*., (1998) on Gladiolus, Pandey *et al*., (2000) on *Iris douglasiana* and Soliman (2002) who reported that chemical fertilization with kristalon or NPK improved vegetative growth, flowering and bulbs yield in *Iris tingitana* cv. "Purple Sensation". On three orchid genera, i.e. Dendrobium cv. Sonia, Oncidium cv. Grower Ramsay and Cattleya cv. Leopoldii, Saiprasad *et al*., (2002) stated that kinetin or BA at 1 mg/L gave the maximum number of protocorm like bodies with high contents of carbohydrates and proteins.

On the same line, those results indicated by various indicators on other ornamental plants; Sooch *et al*., (2002) of carnation, Yong *et al*., (2002) on Anthurium, Lee and Kim (2003) on *Cymbidium tortisepalum*, Ward and Leyser (2004) on Azaleas and Epipermnum, Kalemba and Thiem (2004) on four species of solidago, and Agina *et al*., (2005) who postulated that the combined treatments of kinetin with kristalon, specially at the highest level gave the best vegetative growth, branching and chemical composition (Chlorophyll a , b and carotenoids, as well as minerals content) in *Bougainvillea glabra*, *Cordyline terminalis*, *Ficus microcarpa – nitida* Hawaii and *Jasminum sambac*.

Such trial however was done to detect the most favourable treatment of kinetin and kristalon or both for the best vegetative growth, flowering, corms productivity and chemical composition of *Chasmanthe aethiopica* (L.) N.E. Br. plants.

MATERIALS AND METHODS

A field experiment was conducted at Orman Botanical Garden, Giza, Egypt during the two successive seasons of 2005/06 and 2006/07 to study the effect of foliar spray with kinetin and kristalon on vegetative growth, flowering, corms productivity and chemical composition of Antholyza (*Chasmanthe aethiopica* (L.) N.E.Br.).

Corms of Antholyza at the size of 5.5 cm diameter and about 22.5g weight were stored on September, 1st at 5 °C for 3 weeks in the refrigerator. On September, 21st the corms were got out and dipped in a fungicide solution

of 0.25% orthocide for 15 minutes before planting, the corms were planted at 7cm depth of soil surface in beds of 90x90 cm, as every bed contained 9 corms planted at 30x30 cm for both seasons. Soil samples were taken before planting for physical and chemical analysis as shown in Table (a).

Table (a). Some physical and chemical properties of the soils in two seasons.

Season	Particle size distribution (%)				Soil
	Coarse sand	Fine sand	Silt	Clay	texture
1st season	7.54	22.78	30.55	39.63	Clay
2nd season	7.64	22.50	30.15	39.71	Clay

Season	pH	EC	S.P	Cations (meq/L)				Anions (meq/L)			
		(dS/m)		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	HCO_3^-	$CO_3^=$	Cl^-	$SO_4^=$
1st season	8.05	2.21	55	7.82	2.12	15.4	0.75	6.60	-	8.20	11.29
2nd season	8.12	2.38	50	7.50	2.20	15.5	0.75	6.78	-	8.02	11.15

Irrigation and agricultural practices were done whenever plants needed, as usually grower did, till November, 10th, as the plants were sprayed with kinetin (99% of 6-furfuryl aminopurine, F.W. 215.2, M.P. 269.3 °C, product from Sigma Chemical Co., USA) and kristalon (19:19:19 + micronutrients, manufactured by DSM Agrospecialists, Holland) in three foliar sprays till the solution was run off, with 21 days interval as follows:

1. Control (sprayed with tap water only).
2. Kinetin at 3 levels, i.e. 25, 50 and 75ppm.
3. Kristalon at 3 rates, i.e. 1, 2 and 3 g/L.
4. The combined treatment between kinetin at 50ppm and kristalon at 2 g/L (Combined treatment).

Layout of the experiment was a complete randomized design (Das and Giri, 1986) with three replicates as each bed contained 9 plants expressing one replicate.

Two weeks after the last spray, fresh leaf samples from the middle part of the plants were taken to determine chlorophyll a, b and carotenoids (mg/g F.W.) in the second season according to Moran (1982).

During flowering; No. days from planting to flowering commence and to first floret open (days), flowering stalk length (cm), No. florets/spike and vase life (days) were measured.

At the end of the experiment (on April 15th), the following parameters were monitored: plant height (cm), leaves No./plant, leaves fresh and dry weights (g), No. corms/plant, corm diameter (cm) and corm fresh and dry weights (g). Before and after flowering by about 3 weeks, total indoles and total phenols content (ppm) in fresh leaves and corn samples were measured, due to the methods given by A.O.A.C. (1990). Moreover, the percentages of total carbohydrates (Herbert *et al*., 1971), N (Prygle, 1945), P (Luatamab and Olsen, 1965) and K (Jackson, 1973) in dry samples of leaves and corms were evaluated. Chemical analyses were only assessed in the 2nd season.

The data were statistically analyzed and the method of L.S.D. (at 5%) was used to verify the variance among means of treatments (Mead *et al*., 1993).

RESULTS AND DISCUSSION

1. Effect of kinetin, kristalon and the combined treatment on vegetative growth:

According to data presented in Table (1), it could be concluded that all kinetin treatments showed little effects upon plant height (cm), as they caused non-significant increase in this parameter when compared to the control in both seasons, with the exception of kinetin treatment at 25 ppm in the second season, which significantly increased such trait to 65.33 cm comparing with 56.00 cm for the control. On the other hand, kristalon treatments at 1 and 3 g/L decreased plant height, while the rate of 2 g/L increased it with non-significant differences when compared to the control in the two seasons. The tallest plants, however, were obtained when plants were treated with 50ppm kinetin + 2 g/L kristalon, as this combination significantly raised such character to reach 65.73 and 66.47 cm in the first and second seasons, respectively.

Table (1): Effect of kinetin, kristalon and the combined treatment on vegetative growth of *Chasmanthe aethiopica* (L.) N.E.Br. in 2005/06 and 2006/07 seasons.

	Plant height (cm)		Leaf No./plant		Leaves F.W.		Leaves D.W	
Treatments	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	58.63	56.00	14.00	14.00	21.71	20.95	7.80	7.50
Kinetin at 25 ppm	64.90	65.33	14.00	14.00	73.80	74.17	16.52	17.76
Kinetin at 50 ppm	59.00	56.67	14.00	14.00	56.40	48.28	10.45	9.78
Kinetin at 75 ppm	61.00	63.00	14.00	14.00	46.15	44.20	10.78	10.27
Kristalon at 1 g/L	51.92	51.60	14.00	14.00	36.50	36.21	9.39	9.16
Kristalon at 2 g/L	59.53	62.00	14.00	14.00	45.19	47.30	11.10	11.56
Kristalon at 3 g/L	53.62	52.00	14.00	14.00	37.45	37.00	10.33	10.12
Combined treatment	65.73	66.47	14.00	14.00	75.18	76.28	17.00	17.96
L.S.D at 5%	7.00	9.25	N.S.	N.S	25.33	28.63	3.58	4.17

The number of leaves/plant was not affected by either treatments used in this work. That may be due to that this trait is genetically controlled. Fresh and dry weights of the leaves, however, were found to be improved in response to all treatments, specially the low level of kinetin (25 ppm) and the combined treatment, as these two parameters were significantly increased over the control in both seasons, with the superiority of the combined one, which gave in general, the heaviest fresh and dry weights comparing with control and other treatments.

Predominance of the combined treatment over other ones may be due to the synergistic effect of both kinetin, as a cell division promoter, and kristalon, as a complete fertilizer which supplies the new formed ograns with their required nutrients necessary for good growth. Such results, however,

are coincided with those attained by El-Bably (2003) on *Antholyza aethiopica*, Auda (1992) on amaryllis, Shahin (1998) on crinum and Hemerocallis, Pandey *et al*., (2000) on *Iris douglasiana* and Soliman (2002) on *Iris tingitana* cv. "Purple Sensation"

2- Effect on flowering:

Data in Table (2) revealed that kinetin at 25 and 50 ppm induced non significant precocity in the No. days from planting to flowering start in both seasons. The opposite was the right for 75ppm kinetin treatment, which was slightly delayed flowering, and for kristalon treatments, which prolonged the time required for flowering commence with significant differences in most cases of the two seasons. The combined treatment, however, caused the earliest flowering, which was hastened by about 5-7 days over control in the two seasons.

A similar trend was also obtained with regard to number of days from planting to first floret open, as the combined treatment recorded the earliest floret opening compared to the control plants, as it advanced it by 8.67 and 7.00 days earlier than control in the two seasons, respectively. This may explain the role of kinetin in promoting cell division and increasing flower primordia differentiation within the flower bud, and the role of kristalon as a complete fertilizer of macro and micronutrients necessary for accelerating flower bud development and opening.

Table (2): Effect of kinetin, kristalon and the combined treatment on flowering of *Chasmanthe aethiopica* (L.) N.E.Br. in 2005/06 and 2006/07 seasons.

	No. days from planting to flowering start (days)		No. days from planting to 1st floret open (days)		Flowering stalk length (cm)		No. floret per spike		Vase life (days)	
Treatments	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	102.00	101.50	114.00	113.75	84.6	85.0	35.6	34.5	11.67	10.33
Kinetin at 25 ppm	97.00	96.70	107.75	108.00	93.6	94.0	39.2	40.0	14.00	14.00
Kinetin at 50 ppm	100.00	100.00	112.33	111.50	74.5	78.3	32.0	32.0	13.00	12.36
Kinetin at 75 ppm	106.20	105.00	118.20	123.00	83.0	83.4	38.8	38.0	13.00	13.33
Kristalon at 1 g/L	113.40	112.33	120.00	121.00	60.6	57.9	30.0	32.0	12.26	12.50
Kristalon at 2 g/L	105.25	109.00	113.00	112.36	84.0	91.7	35.5	36.0	14.76	14.00
Kristalon at 3 g/L	107.50	109.00	118.50	120.00	79.0	78.1	35.5	35.7	13.33	12.96
Combined treatment	95.67	96.30	105.33	106.75	95.2	94.0	42.0	42.0	15.00	15.00
L.S.D at 5%	6.21	5.16	6.25	5.71	7.86	8.42	3.5	3.5	2.3	2.9

Concerning flowering stalk length (cm), data in Table (2) clear that it was reduced as a result of spraying with kinetin at 50 and 75ppm, and with kristalon at 1, 2 and 3 g/L with various significance levels in both seasons, except for the medium and high rates of kristalon (2 and 3 g/L), which insignificantly increased this parameter in the second season to 91.7 and 78.1 cm, respectively. The longest stalks, however, were resulted from 25ppm kinetin treatment and the combined one, as they significantly raised the means of such character to 93.6 and 94.0, and 95.2 and 94.0cm against 84.6 and 85.0 cm for control in the first and second seasons, respectively.

The excellence of the combined treatment in increment flowering stalk length may indicate the role of kinetin in accelerating the division of the flowering stalk meristematic cells, and the stimulatory effect of kristalon on encouraging metabolic processes in these cells as noticed by El-Bably (2003) on *Antholyza aethiopica*, Auda (1992) on amaryllis, Shahin (1998) on Crinum and Hemerocallis, Soliman (2002) on *Iris tingitana* cv. "Purple Sensation" and Kalemba and Thiem (2004) on Solidago.

Regarding number of florets/spike and the vase life of spike (day), results in Table (2) exhibit that such two traits were significantly increased when plants were sprayed with kinetin at 25 ppm and the combination between 50ppm kinetin and 2g/L kristalon in the two seasons. A similar trend was also obtained with the high level of kinetin (75 ppm) in the second season only and with 2 g/L krisralon treatment, which elevated the vase life only in both seasons to 14.76 and 14.00 days, respectively. In general, the highest averages of these two traits were registered by the combined treatment indicating the synergistic effect of both kinetin and kristalon on flowering induction processes in the apex. Such gains, however, are in harmony with those attained by Shahin (1998) who revealed that the combination of 50ppm kinetin and 3 ml/L Greenzit significantly increased flowering stalk length, No. florets/stalk and vase life of Crinum and Hemerocallis inflorescences. In addition, Kalemba and Thiem (2004) reported that Kinetin at 9.3UM multiplied flowering stalk length and flowers number in *Solidago virgaurea*, *S. gigantean*, S. *canadensis* and *S. graminifolia*.

3- Effect on corms productivity:

Data in Table (3) show that kinetin at 25ppm and the combination between 50ppm kinetin and 2 g/L kristalon are the only treatments which recorded the highest increase in the number of corms/plant and corm diameter (cm) with significant differences when compared to control in both seasons. This result may be due to the role of kinetin on overcoming the apical dominance of the main bud in the corm and encouraging the lateral ones to develop into new corms. Besides, the role of kristalon as a complete fertilizer, in supplying the growing buds with the required nutrients necessary for their growth, thus more corms production occurs with good quality.

On the other hand, fresh and dry weights of new formed cormels were clearly increased in response to either level of kinetin or kristolon used in the present study, as well as the combined treatment. Such increment was significant in most cases of the two seasons with the mastery of combined treatment, which registered the heaviest fresh and dry weights comparing with control and all other treatments. These results may explain the role of kinetin on increasing carbohydrates and proteins synthesis and causing transport of many solutes from older parts of a plant to the storage organs (Pandey *et al*., 2000). However, Saiprasad *et al*., (2002) reported that kinetin or BA at 1 mg/L gave the maximum number of protocorm-like bodies with high contents of carbohydrates and proteins in orchid genera of Dendrobium cv. Sonia, Oncidium cv. Grower Ramsay and Cattleya cv. Leopoldii. In addition, kristalon as a source of nutrient elements had a helpful effect on carbohydrates and other solutes synthesis which accumulate in the new corms. However, El-Bably (2003) postulated that fertilizing *Antholyza*

aethiopica with NPK (10 + 6 + 5 g/plant, respectively) significantly raised corms number and their fresh and dry weights.

Table (3): Effect of kinetin, kristalon and the combined treatment on corm productivity of *Chasmanthe aethiopica* (L.) N.E.Br. in 2005/06 and 2006/07 seasons.

	No. corms/plant		Corm diameter(cm)		Corm F.W. (g)		Corm D.W. (g)	
Treatments	1st season	2nd season	1st season	2nd season	1st season	2nd season	1st season	2nd season
Control	3.00	4.00	4.82	3.76	7.38	8.76	2.85	3.10
Kinetin at 25 ppm	7.67	8.36	5.80	6.20	33.50	36.24	8.76	10.97
Kinetin at 50 ppm	4.33	4.00	5.46	4.33	32.74	30.17	9.00	8.75
Kinetin at 75 ppm	4.00	4.00	4.50	4.71	18.80	19.67	5.46	5.67
Kristalon at 1 g/L	5.83	5.76	4.90	4.00	20.45	16.80	6.19	5.12
Kristalon at 2 g/L	5.00	5.33	5.34	4.46	21.50	22.33	7.00	7.10
Kristalon at 3 g/L	5.00	5.00	5.10	4.93	20.56	19.58	6.32	5.96
Comb. treatment	9.75	10.25	6.33	5.93	28.15	23.96	8.56	7.98
L.S.D at 5%	2.93	2.87	0.67	1.26	11.46	10.98	4.17	4.33

4- Effect on chemical composition:

With regard to pigments content (mg/g F.W.) in the leaves, as indicated in Table (4), it could be concluded that all kinetin rates and low and medium levels of kristalon (1 and 2 g/L) showed slight effects upon the chlorophyll a content, while 3g/L kristalon and the combined treatment markedly elevated this content to the utmost averages of 2.262 and 2.305 mg/g F.W., respectively comparing with control and other treatments. However, chlorophyll b content was greatly increased due to the low level of kinetin (25ppm) and all rates of kristalon, as well as the combined treatment, which gave the highest mean overall. The opposite was the right concerning carotenoids content, as all kinetin and kristalon levels reduced it except for the high level of kristalon (3 g/L), which raised such parameter to the highest record (1.912 mg/g F.W.) followed by 1.863 mg/g F.W. recorded by the combined treatment. These results may interpret the role of kinetin on promoting stroma lamella formation and grana and chlorophyll appearance during normal leaf growth (Harvey *et al*., 1974), as well as the role of kristalon, as a source of nutrients necessary for stroma lamella and grana development.

As for total indoles and total phenols content, data in Table (5) indicate that total indoles in the leaves of treated and untreated plants before flowering were close, but in the corms they were slightly increased in response to either kinetin or kristalon treatments. Plants sprayed with kinetin at various rates and the combination between 50 ppm kinetin + 2 g/L kristalon somewhat contained higher indoles than those sprayed with kristalon treatments. After flowering, the opposite was the right, where all kinetin and kristalon treatments, as well as the combined one greatly raised indoles content in the leaves and corms of treated plants, with the exception of kristalon treatments, which slightly increased such parameter in the leaves.

Table (4): Effect of kinetin, kristalon and the combined treatment on pigments content (mg/g F.W.) in the leaves of *Chasmanthe aethiopica* (L.) N.E.Br. in 2006/07 season.

Treatments	Chlo. a	Chlo. a	Carotenoids
Control	1.591	0.973	1.778
Kinetin at 25 ppm	1.781	1.196	1.597
Kinetin at 50 ppm	1.645	0.982	1.398
Kinetin at 75 ppm	1.690	0.988	1.426
Kristalon at 1 g/L	1.610	1.198	1.495
Kristalon at 2 g/L	1.693	1.238	1.426
Kristalon at 3 g/L	2.262	1.377	1.912
Comb. treatment	2.305	1.389	1.863

This may indicate the role of kinetin and kristalon on decreasing the inhibitors, simultaneously with a constant of promoters content to induce flowering. On the other side, phenols content before flowering was progressively decreased with increasing the level of either kinetin or kristalon. The least content, however, was registered by the combined treatment. Decreasing of phenols content in the leaves and corms before flowering was greatly less than indoles content, and that may be the reason of forcing the treated plants to flower before the untreated ones in most cases. After flowering, the opposite was the right, where the various levels of kinetin or kristalon resulted a clear increment in such parameter in the leaves and corms except for kristalon treatment at the rate of 3 g/L, which slightly raised this trait to 4.7 against 4.5 ppm in the leaves of control, and to 13.3 against 12.5ppm in the corm of control. However, increasing the content of indoles in the leaves and corms of treated plants after flowering more than phenols content may be the reason of increasing number and quality of new corms produced on treated plants when compared to those obtained by control ones. This may exhibit that phenols may play a role in the control of growth, flowering and corms production of the plant in conjunction with the other hormones. In this concern, Kenneth (1979) reported that phenolic compounds modify the activity of IAA-oxidase and might therefore be acting on flowering or offsets production by way of changes in endogenous auxins level.

In the matter of total carbohydrates (%), it was obvious that all treatments elevated this constituent in the leaves and corms (Table, 5), with the superiority of the combined treatment, which increased such parameter to 45.48% in the leaves and to 77.12% in the corms. These findings may explain the combined effect of kinetin and kristalon to lump their benefits for increasing the photosynthesis rate, which leads finally to more carbohydrates accumulation in plant organs, specially in the corms.

Concerning N, P and K, data in Table (5) reveal that such minerals were generally increased in response to either kinetin or kristalon treatments, with mastery of the combination between 50ppm kinetin and 2 g/L kristalon, which gave the utmost high contents of these nutrients comparing with control and other treatments. This may be due to the combined effects of both kinetin, as a growth regulator promoting metabolism activity and its ability to slowing the breakdown of the formed metabolites, and kristalon, as a

complete fertilizer supplying the plants with the required nutrients necessary for metabolism processes and plant growth. In general, it was noticed that chemical constituents content in corms was higher than that in the leaves. That is reasonable because the corm is considered the main storage organ in such bulbous plant.

The aforementioned results, however, are in accordance with those of Shahin (1998) on Crinum and Hemercallis, Lee and Kim (2003) on *Cymbidium Lortisepalum* and Agina *et al*., (2005) on *Bougainvillea glabra*, *cordyline terminalis*, *Ficus microcarpa* (nitida) Hawaii and *Jasminum sambac*.

According to the previous results, it could be concluded that to obtain the best vegetative growth, flowering, good chemical content and more corms with good quality of *Chasmanthe aethiopica* (L.) N.E.Br., the plants should be thrice sprayed with a combination between kinetin at 50ppm and kristalon at 2 g/L with three weeks interval after 50 days from planting.

Table (5): Effect of kinetin, kristalon and the combined treatment on indoles, phenols, total carbohydrates, N, P and K in the leaves of *Chasmanthe aethiopica* (L.) N.E.Br. in 2006/07 season.

	Indoles (ppm)		Phenoles (ppm)		Total			
Treatments	Before	After	Before	After	Carbo-	N	P	K
	flowering	flowering	flowering	flowering	hydrates (%)	(%)	(%)	(%)
	In the leaves							
Control	21.00	5.00	9.48	4.5	37.36	1.80	0.37	2.68
Kinetin at 25 ppm	20.76	12.76	6.90	7.3	42.70	1.93	0.45	3.67
Kinetin at 50 ppm	21.12	12.25	5.58	7.0	43.86	2.05	0.51	3.33
Kinetin at 75 ppm	21.42	9.25	5.04	6.0	41.67	1.86	0.42	3.10
Kristalon at 1 g/L	21.18	5.33	7.34	7.0	38.76	2.21	0.45	3.58
Kristalon at 2 g/L	20.86	5.60	6.46	5.4	42.41	2.30	0.56	3.25
Kristalon at 3 g/L	21.50	5.10	5.87	4.7	43.00	2.00	0.43	3.42
Combined treatment	21.35	12.78	5.00	7.5	45.48	2.38	0.61	3.80
	In the corms							
Control	23.41	7.58	12.00	12.50	61.35	2.25	0.37	3.12
Kinetin at 25 ppm	25.08	12.00	9.48	17.00	79.78	2.51	0.44	3.96
Kinetin at 50 ppm	25.17	12.38	7.98	17.00	65.73	2.63	0.39	4.00
Kinetin at 75 ppm	25.20	10.78	7.80	14.10	65.10	2.46	0.39	3.71
Kristalon at 1 g/L	24.33	15.33	10.46	16.00	64.76	2.59	0.45	4.19
Kristalon at 2 g/L	24.61	13.50	10.16	14.90	65.68	2.60	0.60	4.07
Kristalon at 3 g/L	24.38	10.00	8.67	13.30	65.50	2.34	0.48	3.81
Combined treatment	25.06	11.75	7.66	15.70	77.12	2.73	0.65	4.98

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إستجابة نباتات الأنثوليزا للرش بالكينيتين والكريستالون

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تعتبر الأنثوليزا (*Chasmanthe aethiopica* (L.) N.E.Br.) واحدة من أبصال الزينة المزهرة المحببة لدى بعض الهواة والتى تستخدم فى العديد من التنسيقات، إلا ان إكثارها بالبذرة يحتاج ما بين (٣-٤) سنوات للحصول على نباتات مزهرة، والذى غالباً ما يكون مصحوباً بحدوث العديد من الإنعزالات الوراثية التى تعطى نباتات مخالفة. ومن ثم فإن إكثارها بالكورمات او الكريمات الجديدة يعتبر من أهم الوسائل للحفاظ على صفات وخصائص الصنف أو السلالة المنزرعة، كما أن العمل على زيادة إنتاج هذه الكورمات والكريمات حول النبات الأم يعتبر أحد التقنيات الهامة للتوسع فى إنتاج وزراعة هذا النبات. لذلك أجريت تجربة حقلية بحديقة الأورمان النباتية ، الجيزة – مصر خلال الموسمين المتتابعين ٢٠٠٦/٢٠٠٥ ، ٢٠٠٧/٢٠٠٦ وذلك لدراسة تأثير الرش بالكينتين (هرمون منشط لإنقسام الخلايا وكاسر للسيادة القمية) بتركيزات صفر ، ٢٥ ، ٥٠، ٧٥ جزء فى المليون، والكريستالون (سماد كيمائى مركب ١٩:١٩:١٩ + العناصر الصغرى) بمعدلات صفر، ١، ٢،٣ جم/لتر والمعاملة المشتركة بينهما (٥٠ جزء فى المليون كينيتين + ٢جم/لتر كريستالون) على النمو الخضرى ، الإزهار، إنتاج وجودة الكورمات ، وكذلك المحتوى الكيميائى لأوراق وكورمات نبات الأنثوليزا).

وقد أوضحت النتائج المتحصل عليها ان جميع المعاملات، بإستثناء الكريستالون بمعدل ١، ٣جم/لتر أدت الى تحسين إرتفاع النباتات وزيادة الوزن الطازج والجاف للأوراق، مع تفوق المعاملة المشتركة والتى أعطت معنوياً أطول النباتات وأثقلها وزناً طازجاً وجافاً. على الجانب الآخر، لم يتأثر عدد الأوراق /نبات بأى معاملة من المعاملات التى طبقت فى هذه الدراسة. وقد أدت المعاملة المشتركة أيضاً الى تحقيق أفضل معدل لتبكير الإزهار ولسرعة تفتح الأزهار وأفضل جودة للنورات الناتجة (مقدرة على اساس: طول الحامل الزهرى ، عدد الزهيرات/نورة وعمر النورات بالزهرية) ، كما أدت الى إعطاء أكبر عدد وأحسن جودة للكريمات المتكونة على النبات ، أعلى محتوى من الصبغات فى الأوراق (حاصة كلوروفيللى أ ،ب) ،أفضل توازن بين الهرومونات المنشطة (كالأندولات) والمثبطة (كالفينولات) ، وكذلك أعلى نسبة مئوية للكربوهيدرات الكلية وعناصر النيتروجين والفوسفور والبوتاسيوم فى اوراق وكورمات النباتات المعاملة.

وعليه .. فإننا نوصى برش أوراق نباتات الأنثوليزا *Chasmantha aethiopica* (L.) N.E.Br.) بعد ٥٠ يوم من زراعة الكورمات بتوليفة من الكينيتين (بمعدل ٥٠ جزء فى المليون) والكريستالون (بمعدل ٢جم/لتر) ثلاث مرات وبفاصل ثلاثة أسابيع بين كل رشتين للحصول على أفضل نمو خضرى وزهرى، وأعلى إنتاج للكورمات وكذلك لتحسين المحتوى الكيميائى لأوراق وكورمات النباتات المعاملة.