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Influence of nutrient levels on growth, yield and quality of elite genotypes of *makoi* (*Solanum nigrum* L.)

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Abstract: The experiment consisted of fifteen treatment combinations involving three genotypes and five levels of fertilizer. Among the genotypes, the maximum total alkaloid content and alkaloid yield was recorded in G_1- MG-1 (0.88% and 62.29 kg ha^{-1}) while, it was minimum (0.36% and 23.51 kg ha^{-1}) in G_3-MG-14. The interaction between genotypes and fertilizer levels did not show any significant influence on plant height, leaf area per plant and number of branches at all the three stages of plant growth. Among the interactions of genotypes and fertilizer levels, G_1F_2 (MG-1 and125: 75: 75 Kg NPK ha^{-1} + FYM @10t ha^{-1}) recorded the highest dry herbage yield per plant and per hectare.

Key words: Makoi, Solanaceae, Genotype, Fertilizer, Alkaloid

Introduction

Makoi (*Solanum nigrum* L.), a member of Solanaceae family, is an economically important and newly emerging medicinal crop. Makoi is a glabrous or sparingly pubescent annual herb. The leaves and immature green berries as well as the whole herb are medicinally important. The leaves contain steroidal glyco-alkaloids, solamargine, solasonine, a and b-solanigrine and g-carotenes, luteine, lycopene, cryptoxanthin and vitamin C (Trivedi, 2004). Whereas, immature green berries possesses solamargine, solasonine and á and â solanigrine (Anon, 1972). Besides, the herb also possess two steroidal saponins namely nigrumins-I and II (Tsuyoshi *et al.* 2000). The leaves, immature berries and the entire herb are used as antiseptic and antidysentric, used in cardalgia and gripe. Leaves are applied with benefit to painful and swollen testicles; used as poultice in gouts and rheumatic joints and skin diseases. Leaves and fruits are used as ascites in diseases of *vatam* and *kapham*, stomatitis, anemia, cough and tuberculosis (Yoganarasimhan, 1996). Makoi has also been identified by National Medicinal Plant Board as one among 32 medicinal plants which have great demand both in domestic and international market for commercial cultivation (Anonymous 2003).

Materials and methods

Investigation was carried out at Sanjeevini Vatika, Division of Horticulture, GKVK, Bangalore during *kharif* 2005. The experiment consisted of fifteen treatment combinations involving three genotypes and five levels of fertilizers, laid out in the Factorial Randomised Complete Block Design with three replications (Panse and Sukhatme, 1978). The three genotypes were **G_1** (MG-1), **G_2** (MG-13) and **G_3** (MG-14). The fertilizer+ levels were **F_1** (100: 50: 50 Kg NPK ha^{-1} + FYM @10t ha^{-1} (RDF)), **F_2** (125: 75: 75 Kg NPK ha^{-1} + FYM @ 10t ha^{-1}), **F_3** (150: 100: 100: Kg NPK ha^{-1} + FYM @10t ha^{-1}) , **F_4** (75% of N & P of F_1 + full dose of K + *Azatobacter* + PSF + FYM @ 10t ha^{-1}), **F_5** (75% nutrients through fertilizers + 25% through poultry manure + FYM @ 10t ha^{-1}).

Results and discussion

The interaction between genotypes and fertilizer levels did not show any significant influence on plant height, leaf area per plant and number of branches at all the three stages of plant growth. Among the combinations, significantly maximum dry herbage yield was obtained in G_1F_2 and minimum was recorded in G_1F_1 (Table-1). This may be due to better response of genotype G_1 to F_2 level of fertilization. The different combinations of genotypes and fertilizer levels had a significant effect on total alkaloid content. The treatment combination G_1F_3 registered the highest total alkaloid content. This might be attributed to cumulative effect of G_1 genotype to higher level of nutrients. The increased alkaloid yield per unit area obtained in F_2 was mainly due to increased dry herbage yield coupled with comparatively higher alkaloid content in the plant. Similar trend was observed by Singh *et al.* (2004) in French basil, Balyan and Sobti (1990) in *Ocimum gratissimum* for oil yield and Kalyanasundaram *et al.* (1981) in senna for sennoside yield. Among various treatment combinations, G_1F_3 registered the highest alkaloid yield per hectare. This increased alkaloid yield per hectare is attributed to higher dry herbage yield and higher alkaloid content was recorded in G_1F_3.

The interaction between genotypes and fertilizer levels did not show any significant influence on plant height, leaf area per plant and number of branches at all the three stages of plant growth. Among the interactions of genotypes and fertilizer levels, G_1F_2

Table 1: Influence of nutrient levels on growth, yield and quality of elite genotypes of makoi (*Solanum nigrum* L.)

Treatments combinations	Plant height (cm)			Number of branches per plant			Leaf area/ plant at harvest (cm^2)	Dry herb yield ($g\ l^{-1}$)	Dry herbage yield (t/ha)	Total alkaloid (%)	Alkaloid yield ($kgha^{-}$)
	30 DAT	45 DAT	At harvest	30 DAT	45 DAT	At harvest					
G_1F_1	26.60	51.47	78.50	3.47	17.47	26.92	6299.94	63.61	4.71	0.63	29.51
G_1F_2	36.73	75.13	93.48	5.73	31.13	35.37	12316.32	135.61	10.05	0.95	95.43
G_1F_3	27.80	65.32	86.77	5.03	27.20	29.20	9610.23	105.27	7.80	1.03	80.28
G_1F_4	29.63	61.97	79.78	4.50	25.73	28.52	7221.03	78.50	5.40	0.87	46.94
G_1F_5	34.27	55.93	81.17	4.80	26.73	29.44	7807.60	86.17	6.38	0.93	59.30
G_2F_1	37.60	64.67	77.53	4.93	25.93	31.27	6717.40	68.55	5.08	0.55	33.00
G_2F_2	40.93	76.96	80.02	6.53	28.27	31.93	8353.06	87.42	6.48	0.41	27.19
G_2F_3	46.67	84.38	89.83	7.27	31.73	33.90	9197.54	110.77	8.21	0.44	40.20
G_2F_4	41.13	65.78	71.45	5.33	26.60	28.83	7579.79	83.99	6.22	0.39	22.39
G_2F_5	43.20	71.27	79.73	6.13	28.20	29.73	8663.35	87.50	6.48	0.45	29.15
G_3F_1	41.60	68.33	71.73	5.73	27.07	30.33	4578.82	74.65	5.53	0.39	23.76
G_3F_2	49.60	84.23	87.28	6.73	32.60	33.02	8690.18	113.67	8.42	0.35	28.62
G_3F_3	46.27	76.78	79.65	6.40	28.33	33.68	7742.87	90.73	6.72	0.37	28.53
G_3F_4	44.10	73.06	75.08	5.8	29.07	31.25	5249.48	77.63	5.75	0.36	20.70
G_3F_5	45.43	74.09	78.33	6.07	30.07	31.00	6733.77	82.5	6.11	0.31	18.94
SEm ±	3.74	6.00	4.65	0.52	2.27	2.11	1002.64	6.68	0.49	0.03	3.57
CD @ 5%	NS	NS	NS	NS	NS	NS	NS	19.36	1.41	0.09	10.35

DAT = Days after transplanting; NS = Non-significant **;** G_1 – MG-1; G_2 – MG-13; G_3 – MG-14; F_1 – 100:50:50 kg NPK ha^{-1}+FYM @ 10 t ha^{-1} (RDF); F_2 – 125:75:75 kg NPK ha^{-1} +FYM@ 10t ha^{-1}; F_3 – 150:100:100 kg NPK ha^{-1}+FYM@ 10t ha^{-1}; F_4 – 75% NP of F_1+ Full dose K + *Azatobacter* + PSF + FYM @ 10 t ha^{-1}; F_5 – 75% Nutrients through fertilizers of F_1 + 25% through poultry manure + FYM @ 10 t ha^{-1}

recorded the highest dry herbage yield per plant and per hectare. As regards to interactions, G_1F_3 recorded maximum alkaloid content, while the alkaloid yield was minimum in G_1F_1.

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