The Pharma Innovation Journal 2023; 12(9): 990-993

www.ThePharmaJournal.com

The Pharma Innovation

ISSN (E): 2277-7695
ISSN (P): 2349-8242
NAAS Rating: 5.23
TPI 2023; 12(9): 990-993
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www.thepharmajournal.com
Received: 27-06-2023
Accepted: 07-08-2023

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Growth parameter and pest incidences of Chinese cabbage as influenced by different growing conditions and hybrid varieties

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Abstract
An experiment entitled "Growth parameter and Pest incidences of Chinese cabbage as influenced by different growing conditions and hybrid varieties" was conducted in five different growing conditions *viz*., 3 different shade nets (35%, 50% and 75%) shade intensity, polyhouse and open condition. Two hybrid varieties *viz*., Sun-60 & Tropical Highland were used for the experimental research in the season of Rabi 2020-21. The experiment was laid out in split plot design with ten treatment combinations and four replications. The results indicated that among the different growing conditions, polyhouse condition (G_4) recorded maximum number of leaves (20.92) and plant height (34.98 cm) at harvest. While leaf length (34.04 cm) and leaf width (22.96 cm) were at par with G_2 (50% shade intensity), (31.92 cm and 21.39 cm) respectively at harvest. Whereas open condition recorded minimum number of leaves, leaf length, leaf width and plant height (15.06, 26.42 cm, 17.73 cm and 28.16 cm respectively) at harvest. Similarly, among two hybrid varieties V_2 (Tropical Highland) recorded maximum number of leaves, leaf length, leaf width and plant height (17.20, 30.75 cm, 17.29 cm and 31.53 cm respectively) at harvest. When it comes to pest incidence (%), the lowest aphid incidence (4.81%) and caterpillar incidence (9.06%) was recorded in polyhouse while, the highest incidence was found in open condition (17.44% and 27.35%) respectively. Similarly, among the hybrid varieties V_2 (Tropical Highland) recorded the lowest aphid and caterpillar incidence (11.28% and 19.13%) respectively. While V_1 (Sun-60) recorded maximum aphid and caterpillar incidence (11.99% & 20.16%) respectively.

Keywords: Chinese cabbage, polyhouse, shade net, growing conditions

Introduction
India has furnished with a diverse range of tropical, sub-tropical and temperate vegetables. Still there are some crops which are rare or unknown to majority of our growers and consumers. Our farmers can earn a lot by cultivating these rare high value cole crops near cities (peri-urban areas) as they fetch high prices in cosmopolitan markets, five-star hotels and places of tourists' attractions (Thapa and Rai, 2012) [14].

Chinese cabbage (*Brassica rapa* var. *pekinensis*) has a green colour head. The Napa cabbage also called as Chinese cabbage. The term 'Chinese cabbage' is used to describe a wide range of Brassica crops, both loose leaf (with or without flowers) and those which form a dense head (Pandey *et al*. 2020) [6]. It is annual to biennial crop but normally it is grown as an annual crop, which takes from 55 to 100 days from sowing to maturity, depending on variety. The cylindrical head of Chinese cabbage is firm but not as firm as cabbage at maturity. The outer foliage and wrapped leaves are characteristically pale green, whereas, the inner leaves are blanched to a creamy white in colour. The leafy type Chinese cabbage has thick white leaf stalk (petiole) and smooth, glossy, dark, green and almost round leaf blades. Flowering Chinese cabbage has small flowers born on top of erect flowers stalks varying in colour from yellow to purple depending on variety. Whole plants are harvested in about 40 – 45 days when two or three flowers have opened (Rana, 2008) [9]. Chinese cabbage is rich in carotene, vitamin B_1 and B_2 and contains more vitamin C than lettuce. Among organic acids, citric acid is major acid found in Chinese cabbage. The total glucosinolates content in Chinese cabbage varies from 0.097 - 0.337 g/kg fresh weight (average 0.198) in heading type and 0.390 - 0.704 g/kg (average 0.534) in leaf type (Lewis and Fenwick, 1988) [4].

Cultivation of horticultural crops under controlled environments or greenhouse is one of the most promising measures for growing vegetables. Cole crops in general are sensitive to weather conditions. Greenhouse provides an excellent facility for protected and also for controlled environment, for cultivation of high value crops. Those people who are residing in metropolitan cities can use their roofs and open floor for greenhouse cultivation for domestic consumption. Temperature plays a major role with regards to growth and development of cole crops under different agro-climatic condition. The green house is usually covered structures of plastic film which allow the solar radiation to pass through it but traps the thermal radiation emitted by plant inside. The CO_2 released by the plants at night also trapped inside, which increases the rate of photosynthesis at day time. The evaporation from the plants and soil also raises the humidity inside (Sirohi and Behara, 2000) [13].

Keeping all the points in view, the present investigation on "Growth parameter and Pest incidences of Chinese cabbage as influenced by different growing conditions and hybrid varieties" is undertaken at the department of Horticulture, Rajarshee Chhatrapati Sahu Maharaj College of Agriculture, Kolhapur with objective to evaluate the Chinese cabbage hybrids for growth, yield and yield attributing characteristics under various growing conditions.

Materials and Methods

The experiment was conducted during the winter 2020-21 at the Instructional-cum-Research Farm of Horticulture Section, Rajarshi Chhatrapati Sahu Maharaj College of Agriculture, Kolhapur, which is situated at 16° 41' North latitude and 74°16' East longitude. The altitude of Kolhapur is 548 meter above mean sea level. Agro-ecologically this area comes under sub-mountain zone of Maharashtra state with annual rainfall range of 1000 to 2500 mm with an average rainfall of 1057 mm. The experiment was laid out in Split plot design having five growing conditions (*viz*, three shade net houses 35, 50 and 75 per cent shading intensities, Polyhouse and open condition) with two hybrid varieties (Sun-60 and Tropical Highland respectively) replicated four times. The transplanting of seedlings was accomplished with the spacing of (45 cm x 30 cm) having plot area (2.4 m × 1 m) in every growing conditions. The recommended dose of fertilizer @ 120:80:80 N, P_2O_5 and K_2O kg ha^{-1} was applied during growing season through drip system. Urea, Phosphoric acid and white potash were used as source of N, P_2O_5 and K_2O respectively. Regular cultural practices as well as crop protection measures were adopted as per the requirements of crops in every growing conditions. The growth parameters such as number of leaves, leaf length, leaf breadth and plant height were recorded at 15, 30, 45 days after transpanting and at harvest. Apart from this pest incidence (%) were also recorded. The average of five plants was computed to get the mean value and this mean value of randomized data were used for standard statistical analysis (Panse and Sukhatme, 1985) [8].

Results and Discussion

Data presented in table 1, confirms that different growing conditions and hybrid varieties had significantly positive influence on growth parameters of Chinese cabbage. Among the growing conditions, polyhouse (G_4) grown Chinese cabbage recorded maximum number of leaves at 15, 30, 45 DAT and at harvest (9.75, 15.19, 18.83, and 20.92), maximum length of leaves at 15, 30, 45 DAT and at harvest (22.22 cm, 29.08 cm, 31.90 cm cm, and 22.96 cm) and maximum plant height at 15, 30, 45 DAT and at harvest (24.34 cm, 31.40 cm, 33.45 cm and 34.98 cm) respectively. The highest plant growth inside polyhouse in and 34.04 cm), maximum breadth of leaves at 15, 30, 45 DAT and at harvest (12.26 cm, 16.97 cm, 20.43 comparison to other growing condition might be due to optimum and congenial micro-climate that prevailed inside the polyhouse might have enhanced faster cell division and cell elongation, which eventually led to more vegetative growth.

Table 1: Influence of different growing conditions and varieties of Chinese cabbage on growth parameters

	No. of leaves				Leaf length (cm)				Leaf width (cm)				Plant height (cm)			
Growing condition (G)	**15 DAT**	**30 DAT**	**45 DAT**	**At harvest**	**15 DAT**	**30 DAT**	**45 DAT**	**At harvest**	**15 DAT**	**30 DAT**	**45 DAT**	**At harvest**	**15 DAT**	**30 DAT**	**45 DAT**	**At harvest**
G_1	9.21	13.77	14.87	15.90	15.66	23.60	26.59	29.88	9.70	13.84	17.21	20.47	19.71	26.20	28.96	30.07
G_2	9.5	14.20	15.02	16.25	18.24	25.90	28.71	31.92	10.90	14.41	17.71	21.39	21.19	27.36	30.11	31.68
G_3	8.56	12.54	14.52	15.41	15.56	22.30	25.42	28.67	8.83	13.20	16.07	18.95	18.13	24.66	26.55	29.58
G_4	9.75	15.19	18.83	20.92	22.22	29.08	31.90	34.04	12.26	16.97	20.43	22.96	24.34	31.40	33.45	34.98
G_5	8.89	13.33	14.49	15.06	12.87	19.30	21.12	26.42	7.46	10.95	13.06	17.73	12.87	20.70	23.02	28.16
S.E.±	0.24	0.33	0.34	0.44	0.48	0.53	0.54	0.77	0.30	0.35	0.36	0.51	0.53	0.74	0.66	0.67
CD @ 5%	0.74	1.00	1.05	1.37	1.48	1.63	1.65	2.37	0.92	1.09	1.12	1.58	1.63	2.27	2.04	2.07
Varieties (V)																
V_1	8.98	13.37	15.18	16.21	16.26	23.45	26.23	29.48	9.55	13.56	16.50	19.80	18.59	25.54	27.82	30.26
V_2	9.38	14.24	15.91	17.20	17.56	24.63	27.27	30.75	10.12	14.19	17.29	20.80	19.91	26.59	29.01	31.53
S.E.±	0.12	0.26	0.23	0.31	0.25	0.31	0.33	0.42	0.16	0.20	0.22	0.32	0.26	0.34	0.39	0.42
CD @ 5%	0.35	0.78	0.71	0.93	0.75	0.93	0.99	1.28	0.47	0.60	0.65	0.97	0.80	1.01	1.18	1.27

DAT: Days After Transplanting, G_1: 35% Shade net, G_2: 50% Shade net, G_3: 75% Shade net, G_4: Polyhouse, G_5: Open condition, V_1: Sun-60, V_2: Tropical Highland

Among the hybrid varieties V_2 (Tropical Highland) recorded maximum number of leaves at 15, 30, 45 DAT and at harvest (9.38, 14.24, 15.91, and 17.20), maximum length of leaves at 15, 30, 45 DAT and at harvest (17.56 cm, 24.63 cm, 27.27 cm and 30.75 cm), maximum breadth of leaves at 15, 30, 45 DAT and at harvest (10.12 cm, 14.19 cm, 17.29 cm and 20.80 cm) and maximum plant height at 15, 30, 45 DAT and at harvest (19.91 cm, 26.59 cm, 29.01 cm and 31.53 cm) respectively. Similar observations on influence of different growing conditions on various growth parameters were also reported by Dixit (2007) [2], Panigrahi (2010) [7], Rane (2020) [10], Ashok and Ravivarman (2021) [1], Garde (2018) [3], Ngullie

and Biswas (2016) [5], Singh *et al.* (2019) [11] and Yasoda *et al*. (2018) [15].

Table 2: Influence of different growing conditions and varieties of Chinese cabbage on days required for head initiation, days required for harvest and yield per hectare (q).

Growing condition (G)	Aphid incidence (%)	Caterpillar incidence (%)
G_1	11.89	20.96
G_2	9.94	15.72
G_3	14.09	25.15
G_4	4.81	9.06
G_5	17.44	27.35
S.E.±	0.62	0.63
CD @ 5%	1.90	1.94
Varieties		
V_1	11.99	20.16
V_2	11.28	19.13
S.E.±	0.16	0.27
CD @ 5%	0.48	0.81

DAT: Days After Transplanting, G_1: 35% Shade net, G_2: 50% Shade net, G_3: 75% Shade net, G_4: Polyhouse, G_5: Open condition, V_1: Sun-60, V_2: Tropical Highland

During the crop period, Aphid and caterpillar incidence were found. The aphid and caterpillar incidence as influenced by different growing conditions and hybrid varieties are presented in Table 2. A statistically significant variation was found for aphid and caterpillar incidence on Chinese cabbage with different levels of growing conditions and hybrid varieties. Significantly lowest aphid incidence (4.81%) and caterpillar incidence (9.06%) was recorded in treatment G_4 (Polyhouse). Less pest incidence in polyhouse might be due to ideal micro-climate inside the polyhouse. Likewise, the aphid and caterpillar incidence were differed significantly among two hybrid varieties. Significantly less aphid incidence (11.28%) and caterpillar incidence (19.13%) were found in V_2 (Tropical Highland). Singh *et al.* (2004) [12] in hybrid sweet pepper also reported maximum pest incidence in open field condition than in protected condition.

Conclusion

Based on the experimental results, it can be concluded that growing of Chinese cabbage under Polyhouse condition and hybrid variety Tropical Highland was found most suitable for achieving higher growth and free from pest incidences during Rabi season.

References

1. Ashok AD, Ravivarman J. Interactive influences of different environmental conditions *viz*., ployhouse, shadenet house and open field conditions and seasons of semi-arid tropics on functional performance of coriander (*Coriandrum sativum* L.) var. CO (CR) 4. J Pharmacog. and Phytochem. 2021;10(1):1414-1416.
2. Dixit A. Performance of leafy vegetables under protected environment and open field conditions. Adv. R. S. J. Crop Improve. 2007;7(2):197-200.
3. Garde AP. Influence of different growing conditions of growth yield and quality of leafy vegetables (Doctoral dissertation, Vasantrao Naik Marathwada Krishi Vidyapeeth, Parbhani), MS; c2018.
4. Lewis J, Fenwick GR. Glucosinolate content of Brassica vegetables-Chinese cabbages Pe-tsai (*Brassica pekinensis*) and Pak-choi (*Brassica chinensis*). J Sci. Food and Agric. 1988;45(4):379-386.
5. Ngullie R, Biswas PK. Performance of capsicum under protected and open field condition. Adv. R. S. J. Crop Improve. 2016;7(2):197-200.
6. Pandey V, Ranjan R, Pandey H, Rawal J, Bala M. Performance of different cole crops in different growing environmental conditions under mid hills of Uttarakhand. Prog. Hort. 2020;52(2):185-192.
7. Panigrahi HK, Tiwari SP, Agrawal N, Agrawal R, Sharma D. Comparative study of Capsicum (*Capsicum annuum* L.) Cv. California wonder under protected (Green house) and open field condition. Int. J Agricult. Stat. Sci. 2010;6(2):659-662.
8. Panse VG, Sukhatme PV. Statistical Methods for Agricultural workers. 2nd Edn. ICAR Publication, New Delhi; c1985.
9. Rana MK. Olericulture in India. Kalyani publishers. New Delhi; c2008. p. 323-324.
10. Rane PP. Performance of Knol-khol under greenhouse and open field conditions. M.Sc. (Hort.), Thesis submitted to Mahatma Phule Krishi Vidyapeeth, Rahuri. 2020.
11. Singh L, Chamroy T, Rajkumari A. Varietal performance of Brinjal (*Solanum melongena* L.) under different growing conditions. Plant Archives. 2019;19(2):2002-2004.
12. Singh D, Kaur S, Dhillon TS, Singh P, Hundal JS, Singh GJ. Protected cultivation of sweet pepper hybrids under net-house in Indian conditions. Acta Hort. 2004;659:515-521.
13. Sirohi PS, Behera TK. Protected cultivation and seed production of vegetables. Indian Hort. 2000;43:23-25.
14. Thapa U, Rai R. Evaluation of Sprouting Broccoli (*Brassicae oleraceae* var. italica) genotypes for growth, yield and quality. Int. J Agric. Sci. 2012;4(7):284.
15. Yasoda PGC, Pradheeban L, Nishanthan K, Sivachandiran S. Effect of different shade levels on growth and yield performances of cauliflower. Int. J Environ. Agri. and Biotech. (IJEAB). 2018;3(3):2456-1878.

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