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An Allometric Growth Estimation Study of *Brassica Rapa* subsp. *Chinensis* (Bok Choy) Collected from villages of Danyore, Oshikhandas, Zulfiqarabad and Khomar district Gilgit, Gilgit-Baltistan, Pakistan.

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Abstract: This allometric study dealt with leaf growth estimation rates of *Brassica Rapa* subsp. *Chinensis* (Bok choy or pak choi) of *Brassicaceae* family. It has a long history of use in the area and know with different vernaculars including 'Hazigar', 'Pino Sha', 'Sha' and 'Hoy'. It is an excellent source of vitamin K, vitamin C, vitamin A in the form of carotenoids, potassium, folate, vitamin B, calcium and manganese. Traditionally it is used against constipation, jaundice, to cure stomach pains and weight loss. Study revealed that mean leaf area of Bok choy in Gilgit -Baltistan is 1270.784 cm^2 and overall mean growth per day growth is 14.12 cm. The average area growth rate in Oshikhandas is 1.4966 cm while in Danyore it is 1.2129 cm, in Zulfiqarabad is 0.5334 cm in Khomer is 14.12 cm.

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Key words: Pak choi, *Brassicaceae*, constipation, jaundice, weight loss, Karakorum, Northern areas.

1. Introduction

Bok choy (*Brassica rapa* subsp. *Chinensis*) is a member of Brassicaceae, classified as a type of Chinese cabbage. The varieties of brassica Rapa are stem less plants, they bear dark green leaves with smooth texture and serrated margin. The Chinensis varieties are widely distributed in Southern china and Southeast Asia. Due to their great tolerance to winter they are also grown in Northern Europe. This group was originally classified and named by Linnaeus as *Brassica Chinensis* **(Wiki, 2016).** It is a flowering plant with a height of 50-60 cm. **(Xu et al., 2009)**

Bok choi has white stalk with dark green serrated leaves resembles to lettuce. Some varieties are recorded in GB, Pakistan that have white stalk. They have a broad mid rib divide into several narrow but long veins. Bok choi is commonly known as pak choi, white cabbage or white vegetable. It is an annual or biennial plant widely cultivated in both temperate and tropical regions. it is especially grown in china for its delicious edible leaves over 1,600 years. The varieties of this family are broadly use for trade purposes. **(Whfoods, 2016)** Chinensis have many varieties differing in size, color and texture. All varieties possess yellow flowers that are hermaphrodite (bisexual) that bloom in spring and summer as high temperatures cause them to flower. They bearing reddish brown to black seeds**. (Learn2grow, 2016)**.

Pak choi is one of the most important vegetables in China and other eastern Asian countries **(Qing et al., 2000)**. It is cultivated in China on large scale and also has wide yield values, and it is also taken as an important vegetable crop in subtropical and tropical regions in the world. **(Coa et al., 2006; Liu et al. 2011; Musgrave et al., 1986; Spena et al., 1992; Sanders et al., 1999; Taylor, 1995)**. Because of their nutritional value their uses are increasing day by day. *Brassica* crops have the ability to reduce the risk of chronic diseases including cardiovascular diseases and cancer. **(Cartea et al., 2011).**

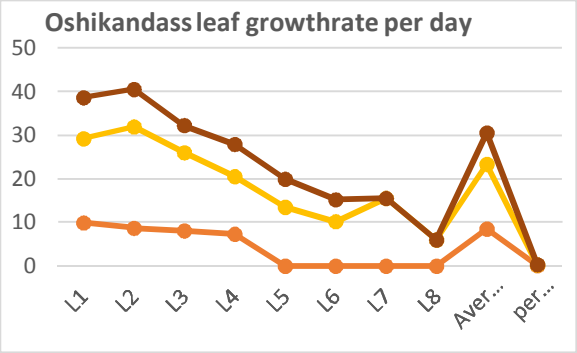
According to Fahey set all, they are also consider an important factor against cancer. Broccoli and other cruciferous vegetables have the ability to protect against cancer. **(Fahey et al., 1997; Wiesnera et al., 2014; Glatté et al., 2011)**. It is also an important vegetable in northern areas of Pakistan because of its nutritional values. In NA"s it is taken as vegetable and salad and also cooked with different other dishes. It shows restriction against jaundice, constipation and is also recommended by doctors as weight loser. Their young and fresh leaves are also used as skin freshener. In G.B they are grown in early spring and also in late summer to harvest during autumn.

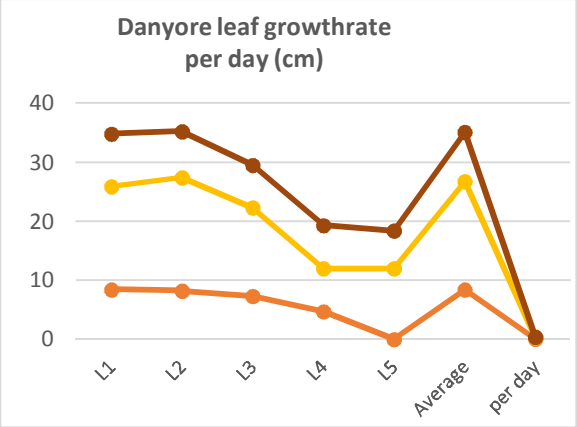
2. Material and method

To study the leaf growth rate of pok choi, we collected plants from different region of GB (Oshikhandas, Danyore, Zulfiqarabad and Khomar). The collected leaves were pressed in newspapers and placed in sunlight for dry. After a couple of days, the dried leaves were mounted on white sheets and the length and width of leaves are measured in cm using scale, pencil and rubber. Than the collected data is plotted in charts for more cleara.

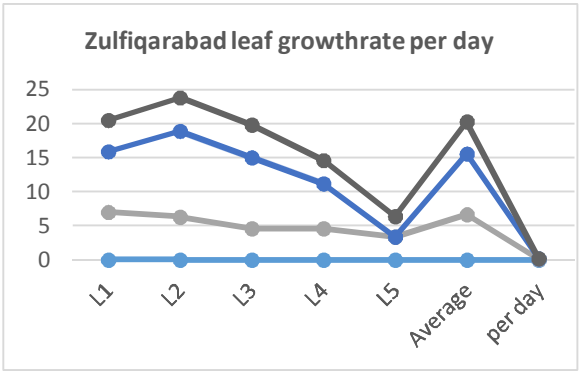
3. Result and discussion

The plants are collected from Oshikhandas, Danyore, Zulfiqarabad and Khomar to compare their leaf growth rate The leaf length of Bok choy vary to a great extend in single plant because the older leaves





grow outward and the inner growing leaves are young thus having low growth rate as that of outermost ones so we can easily find growth difference in a single plant but out study is not concern with it because here we study the growth rate of Bok choy from different areas to check the environmental influence on its growth. This study shows remarkable difference between the leaf areas of the concern regions. According to above chart the leaf area of Oshikhandas is high as compare to Danyore and Danyore has high growth rate as that of Khomar and it shows high growth rate as that of Zulfiqarabad. The average growth rate of Oshikhandas plant is 134.697, Danyore has 109.159, Zulfiqarabad has 48.002 and Khomar has 55.017. The measurements and related charts of Bok choi collected from four different areas of GB shows the growth difference of the leaf in that areas. Above mentioned charts shows the area of leaves and per date growth rate. By studying the charts, it comes to know that Bok choi growth rate is different in different regions of G.B. The plants collected from Oshikandas have higher area and higher per day growth rate. Their leaves are quit broad as compare to other three regions of G.B.In the spring, the plants become sensitive to high temperature and flowered easily. The vegetative growth period is short and resulted in a relatively small plant. In the autumn, the vegetative growth period is longer, which resulted in a bigger plant. The growth recovery is better when followed by a cool temperature environment (Xu, 2008).



4. Conclusion

This paper demonstrates the growth rate of Bok choi. By studying this paper it is concluded that the growth rate of Bok choi in Oshikhandas is greater than other under observed region of GB Pakistan. Thus we suggest our farmers and Cultivars to adopt the farming methods of Oshikhandas to get better yield.

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The first author is student of B.Sc. (hons) at Karakoram International University, Gilgit, Gilgit-Baltistan. This research work is part of my semester assignment conducted during 2016.

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