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Wholesomeness of Wheatgrass Juice - The Green Blood

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Abstract: ***Wheat grass, also known as "green blood, " has gained popularity in recent decades as a source of numerous nutrients and antioxidants that can balance out many of the negative impacts of free radicals and pathogens. The current paper provides us with a great understanding of the breadth of applications of wheatgrass. In this study, two varieties of wheat grains, regular and organic, were grown in the identical conditions as the wheatgrass in an in vitro setting. The pupils' homemade potting mixture, which contained coco peat, organic compost, and gardening soil, was employed. At different heights of 6.5 cm, 9.5 cm, and 16.5 cm, colorimetric and quantitative analysis were used to determine the iron and calcium content in wheat grass juice. The iron and calcium contents of wheatgrass powder, which was made to be 18 cm tall, were estimated using the same techniques. This study also covers estimating chlorophyll at various wheatgrass heights. Since the structure of chlorophyll and haemoglobin are identical with the exception of the central atom, it has been discovered that wheatgrass, which is extremely high in chlorophyll, has a variety of advantages for the human population. This elevates wheatgrass juice's importance in the health realm.***

Keywords: Chlorophyll, wheatgrass juice, haemoglobin

1. Introduction

Wheatgrass is made up of young grass stems from the wheat berry. Wheatgrass appears to be just like any other grass. Culms are 1.2 m tall, simple, hollow or pithy, and hairless. Leaves are flat and narrow, measuring 20 - 38 centimetres long and 1.3 cm wide. Since wheatgrass, the largest edible cereal grass in the world and a member of the poaceae family, has long been used to cure a variety of illnesses, many academics also hold the view that drinking wheatgrass juice lengthens life. Phytochemicals like alkaloids, glycosides, saponins, steroids, tannins, and flavonoids as well as proteins, minerals, vitamins, active enzymes, and flavonoids are all abundant in tender wheatgrass. While the enzymes are essential to this herbal drug's anti - cancer strategy, the vitamin content makes it a crucial adjuvant in antiallergic. One distinguishing quality of wheat grass juice is the presence of bioflavonoids, which are naturally occurring vitamins. The high chlorophyll concentration of wheatgrass juice is its most notable characteristic.70% concentration of chlorophyll, which is nearly similar haemoglobin. To build their individual molecules, haemoglobin and chlorophyll both use an atom structure that is similar. The only distinction is that iron is the primary component of haemoglobin while magnesium is the primary component of chlorophyll. This may be the reason why wheatgrass is useful in treating diseases like thalassaemia and haemolytic anaemia. Wheatgrass boosts metabolism, restores blood alkalinity, and its excess of alkaline minerals aids in lowering blood acidity levels. Additionally, a detoxifier, wheatgrass works to maintain healthy cells. Several flavonoid substances, including sinapic acid, luteolin, apigenin, and quercetin, are also present in wheatgrass liquid. Wheatgrass juice functions somewhat as a treatment for inflammatory bowel illnesses as a result of the presence of these compounds. Wheat grass drink contains a lot of vitamin K, a substance that helps blood clot. If ingested in large amounts, it might make you feel sick and give you a headache. The throat can enlarge in hypersensitive people. People on blood - thinning medications or who are allergic to wheat should take it under medical supervision.

2. Materials and Methods

Two varieties of wheat grains regular and organic wheat grains were acquired from the authorized local market of Secunderabad.30% H_2 SO_4, 7% Potassium Persulphate Solution, 30% Potassium Thiocyanate solution, acetone, Ferrous Ammonium Sulphate, 1: 1 HCl, 7% Persulphate Solution, 4% Ammonium Oxalate Solution, dilute ammonia solution, Liquor ammonia, Potassium Permanganate (0.01N), Sulphuric Acid (1N), Oxalic acid (0.01N) Solution.

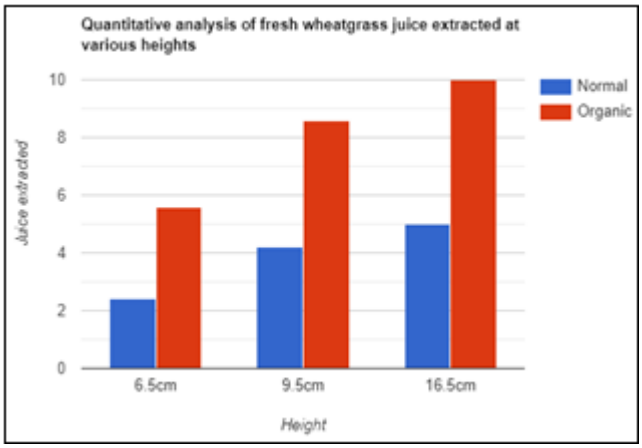
2.1 Cultivation and extraction of wheat grass juice and powder

Triticum aestivum grass was cultivated indoors until it was needed for the tribunals in this study[1]. A 2.5 - inch layer of growth media made up of three parts of soil and one part of

compost and coco peat were placed in the trays. Seeds were then uniformly distributed over it and thoroughly covered with 0.5 inches of soil after overnight soaking and leaving it in a muslin cloth for 24hrs. The soil was equally dusted with little amounts of water, and each day grass was allowed to grow in oblique sunlight for three to four hours. The grass is trimmed 0.5 cm above the earth on the fifth, tenth and fifteenth days, when it is around 6.5, 9.5 and 16.5cms tall respective. Fresh wheatgrass leaves were utilised to make the juice. The finest juice often comes from fresh wheatgrass. Weight of wheatgrass was measured then rinsed to make aseptic, sorted, pulverized to yield juice using grinder then strained using 8 - fold cotton gauge cloth to obtain fresh extract. Wheatgrass was harvested at a height of 18 cm, cleaned, and dried for 24 to 30 hours. The dried samplewas then processed via a grinder to create a fine powder.2.25gm of powder is produced from 12.74 grams of wheatgrass.

Table 2.1: Based on height amount of juice extracted

Sample	Height (cm)	Weight (gm)	Amount of juice extracted (ml)
Regular Wheatgrass	6.5	12.74	2.4
	9.5	12.74	4.2
	16.5	12.74	5
Organic Wheatgrass	6.5	12.74	5.6
	9.5	12.74	8.6
	16.5	12.74	10



2.2 Iron estimation

Iron (Fe) is determined colorimetric ally with ferric iron which gives a blood red colour with potassium thiocyanate which is measured. Prepare standardiron solution and pipette out 10ml of it and make it up to 100ml with distilled water to prepare working standard solution. To prepare sample, to 6.5ml of sample solution 1ml of 30% H_2SO_4, 1ml of 7% potassium persulphate and 1.5ml of 30% potassium thiocyanate solution were added. Measure the red colour that develops, within 20 minutes at 540 nm in a colorimeter after adjusting the absorbance to zero with the blank which consisted of 6.5ml distilled water, 1ml of 30% H_2SO_4, 1ml of 7% potassium persulphate solution, 1.5ml of 30%potassium thiocyanate solution. Absorbance of the standard and sample solution (triplicates) were recorded.

2.3 Calcium estimation

Using Wong's method calcium estimation was done. Ionic calcium present in the medium is precipitated as calcium oxalate by treating it with ammonium oxalate. The amount of calcium is determined titrimetric ally by using potassium permanganate solution, in acidic medium. Standardized $KMnO_4$is used for the qualitative analysis permanganate {Normality of $KMnO_4$ solution = 25 x 0.1/titrate value (ml) }Take 2 ml of the sample solution into a graduated glass centrifuge tube (15ml capacity). Add 2 ml of deionized water followed by 2ml of ammonium oxalate solution and mix thoroughly and leave overnight. The next day mix the contents and centrifuge for 5 minutes at 1500 rpm. To the precipitate add 3ml of dilute ammonia centrifuge. To washed precipitate, add 2 ml of 1N H_2SO_4 and mix. Place the tube in boiling water bath until all the precipitate is dissolved and then titrate the hot solution with standardized potassium permanganate solution taken in a micro burette to a pale pink end point that persists at least for a minute. Blank titration using 1N H_2SO_4 (2ml) against 0.01N $KMnO_4$ solution.

2.4 Estimation of chlorophyll content in wheatgrass

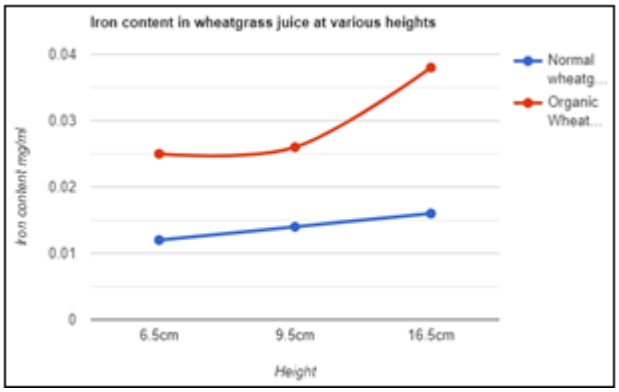
250mg of the sample is smashed with 10ml of acetone and the extract is centrifuged for 10mins at 3000rpm and made up to 25ml in total with 80%alcohol. Using a spectrophotometer, the intensity of the green pigment is measured at wavelengths of 645 nm, 663 nm, and 652 nm for chlorophyll a, chlorophyll b, and total chlorophyll concentration, respectively.

3. Result and Discussion

The experimental investigation was carried out to determine the iron, calcium, chlorophyll content, of juice extracted from wheatgrass at three different heights, namely 6.5 cm, 9.5 cm, and 16.5 cm for two varieties of wheatgrass cultivated from regular and organic wheat. Organic wheatgrass is significantly deeper in colour and thicker overall. Despite the fact that both types of wheatgrass were raised in the same nutrient - rich potting soil and under the same environmental conditions. In comparison to regular wheatgrass, the organic variety produced greater and better yields.

3.1 Iron Content in wheatgrass juice samples at various heights

Regular Wheatgrass Height (cms)	Iron Content (mg/100ml)	Organic Wheatgrass Height (cms)	Iron Content (mg/100ml)
6.5	1.2	6.5	2.5
9.5	1.4	9.5	2.6
16.5	1.6	16.5	3.8
18	1.17	18	0.9



The accompanying table 3.1 shows that the iron content of wheatgrass juice is highest at a height of "16.5" cm (0.016, 0.038), and is much greater than that of juice collected at "6.5 cm" (0.012, 0.025), and "9.5" cm (0.012, 0.025). (0.014, 0.026). The experimental investigation unequivocally demonstrates that the iron concentration varies with wheatgrass height. and the aforementioned study demonstrates that 0.016 and 0.038 mg/ml are the maximum amounts in both regular and organic wheatgrass, respectively. The comparison of the iron content of regular wheatgrass and organic wheatgrass shows that organic wheatgrass has a higher iron content (0.038 mg/ml) than regular wheatgrass (0.016 mg/ml) significant increase in the iron content. The ideal height of wheatgrass for consumption is 16.5cm as the iron content is at its peak

3.2 Calcium content in Wheatgrass juice samples at various heights

Regular Wheatgrass Height (cms)	Calcium Content (mg/100ml)	Organic Wheatgrass Height (cms)	Calcium Content (mg/100ml)
6.5	20.96	6.5	28.83
9.5	23.85	9.5	36.54
16.5	31.45	16.5	38.66
18	11.7	18	11.2

The aforementioned table 3.2 makes it quite evident that as grass height rises, so does the calcium content of wheatgrass juice. Both regular and organic wheatgrass contain the highest levels of calcium at the height of "16.5cm, " i. e.31.45 mg/100ml and 38.66 mg/100ml, respectively. This is much higher than the calcium content at "6.5cm" (20.96, 28.83 mg/100 ml) and "9.5cm" (23.85, 36.54 mg/100 ml) which are the early growing stages of regular and organic wheatgrass, respectively. When regular and organic wheatgrass' calcium contents were compared, it was found that the organic wheatgrass had a greater calcium content (38.66mg/100ml). Hence, the ideal height of wheatgrass for consumption is 16.5cm as the calcium content is maximum.

3.3 Estimation of Chlorophyll content

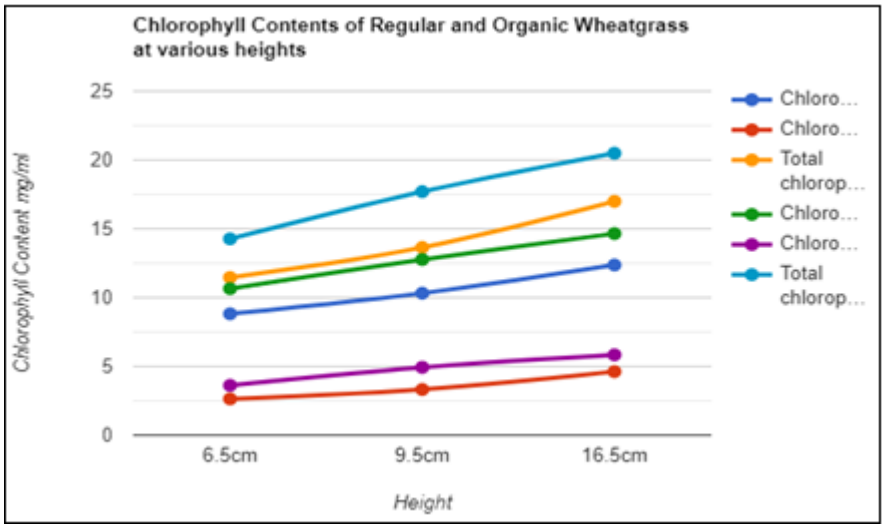
Comparative investigation demonstrates that the chlorophyll content of organic wheatgrass is significantly higher than that of regular wheatgrass, i. e.20.49 mg/ml and 16.99 mg/ml, respectively. When wheatgrass reaches a height of 16.5 cm, both regular and organic varieties have the highest chlorophyll content.

3.3.1Organic Wheatgrass Sample

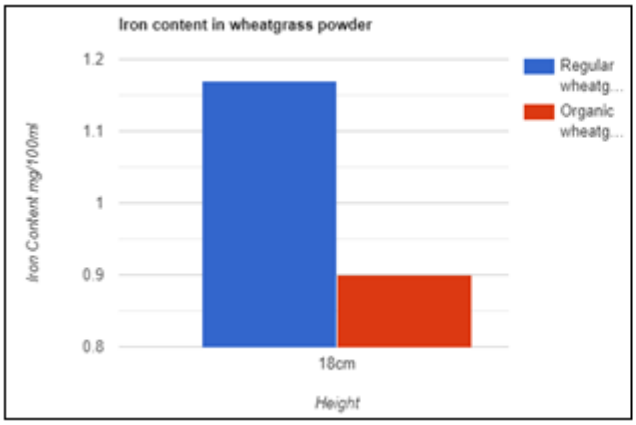
Height (cm)	Chlr a (mg/gm)	Chlr b (mg/gm)	Chlra+b (mg/gm)	Chlr a/b (mg/gm)
6.5	10.65	3.62	14.27	2.9419
9.5	12.77	4.93	17.7	2.5902
16.5	14.65	5.84	20.49	2.5085

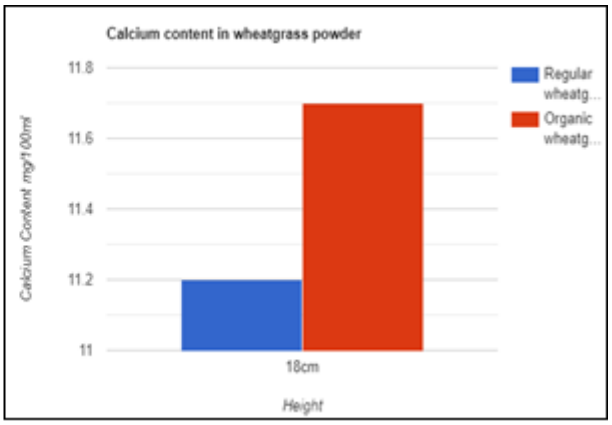
3.3.2 Regular Wheatgrass Sample

Height (cm)	Chlr a (mg/gm)	Chlr b (mg/gm)	Chlra+b (mg/gm)	Chlr a/b (mg/gm)
6.5	8.2	2.64	11.46	3.3409
9.5	10.32	3.321	13.641	3.1074
16.5	12.37	4.623	16.993	2.6757



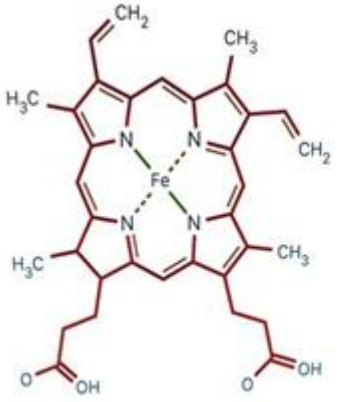
3.4 Iron and Calcium content in wheatgrass juice made from wheatgrass powder:

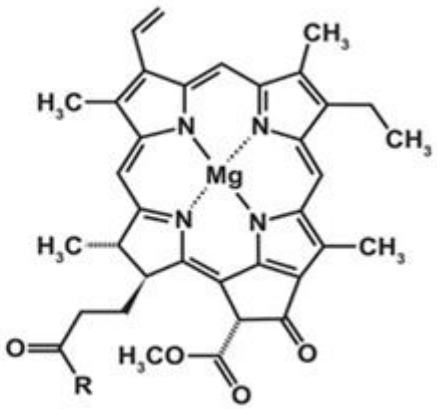




4. Conclusion

The findings led to the conclusion that as wheatgrass height grows, so does the amount of iron and calcium in wheatgrass juice. In order to ascertain the chlorophyll concentration at various heights, the samples were further analysed. It is obvious that as plant growth grows, so does the iron and calcium content. Regular and organic wheatgrass were compared, and the results indicate that the organic variety has a higher chlorophyll content as well as higher levels of iron and calcium. Based on the aforementioned data, we can infer that as wheatgrass height increases, so does the amount of iron, calcium, and chlorophyll in the plant. Additionally, organic wheatgrass contains more nutrients than conventional wheatgrass. According to the research, 16.5 cm is the ideal height to harvest grass in order to harvest it for human consumption because it has the most nutritious content. To restore a person's health, it can be included in their regular diet in the form of fresh juice or dried powder.





In terms of the design of their porphyrin centres, it is possible to show how haemoglobin and chlorophyll are similar. The two compounds share a striking resemblance in their tetrapyrrole ring structures; the only distinction between them is the nature of the main metallic atom, which is either magnesium (Mg) in the chlorophyll or iron (Fe) in haemoglobin. Thus, it is believed that their resemblance is what contributes to the therapeutic benefits of chlorophyll in

cases involving haemoglobin deficiency. In contrast to plants, which have an active metabolic agent called chlorophyll that assimilates carbon from the atmosphere by producing two electrons that are then transmitted through an electron transport chain, higher animals have protein bodies called haemoglobin and its congeners that serve as the oxygen carrier by binding two electrons attached to the oxygen molecule. The two compounds' structural similarity is thought to be the cause of chlorophyll's restricted use as a blood substitute in conditions like chronic anaemia, tissue hypoxia, thalassemia, and other haemolytic diseases, among others. The structure of their porphyrin heads can be used to highlight the connection between chlorophyll and haemoglobin. The main variation between the two compounds' structures, which both have a tetrapyrrole ring structure, is the type of the central metal atom: magnesium (Mg) in chlorophyll and iron (Fe) in haemoglobin. Thus, it is believed that the similarities between the two are what causes chlorophyll to have therapeutic effects in cases of haemoglobin shortage.

Future Prospects

Attributing to the structural similarity between chlorophyll and haemoglobinthe wheatgrass juice as a blood substitute in situations like chronic anaemia, tissue hypoxia, thalassemia, and other haemolytic disorders.

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References

[1] https://www.researchgate. net/publication/297403454_Determination_of_Minerals_and_Antioxidant_Activities_at_Different_Levels_of_Jointing_Stage_in_Juice_of_Wheat_Grass_ - The_Green_Wonder
[2] https://www.ijert. org/quantitative - analysis - of - essential - metals - magnesium - calcium - and - iron - in - various - indian - vegetables - and - fruits
[3] https://slideplayer. com/slide/6190089/
[4] https://d1wqtxts1xzle7. cloudfront. net/46629963/RBC_paper_2014 - libre. pdf?1466387713=&response - content - disposition=inline%3B+filename%3DHealing_effects_of_Wheat_Grass_Triticum. pdf&Expires=1677087738&Signature=YK4a8rkrgAGhyNWxK - prOwFRRliX9bZ~nklvBbH7zLRh9Jar6DMyA3WcXDMOi0TW4pzLvOGF44vMkQDVH3Ue2ruNZjRrhJTCBmTHptv5LzioEtSBaYI3xWIViuJfjBJMVeNBew9fxYr8e~YKp4WboqwYoh8zEFxOy1XuU88z1fwx2kusD - DtmzZhgvIXKWgmm~M7m80CKBCwCSq2qjpihTk6XKRzBjfAwG7o4GYj6VfcS2ME7fMZlYj01SIYURc1TxY6aGov - ds4m6y1g6auDqe~K3bv1cnYqlETcyb9wN0ivhD7CETBMVQ8yhO7GywZCCa2G7nh487gDnvWSI6ohw__&Key - Pair - Id=APKAJLOHF5GGSLRBV4ZA
[5] https://citeseerx. ist. psu. edu/document?repid=rep1&type=pdf&doi=9e4de0da668aa7ec00300b7e15b5fbdd2938d060
[6] https://www.ijfans. org/uploads/paper/3eb658ae2509489b4dbe58434539b260. pdf
[7] https://www.ncbi. nlm. nih. gov/pmc/articles/PMC5223247/
[8] https://www.researchgate. net/publication/340477392_Chemical_Composition_Minerals_and_Vitamins_Analysis_of_Lyophilized_Wheatgrass_Juice_Powder
[9] https://www.healthline. com/nutrition/wheatgrass - benefits#TOC_TITLE_HDR_10
[10] https://pharmeasy. in/blog/ayurveda - uses - benefits - side - effects - of - wheatgrass - juice/
[11] http://www.wheatgrassevidence. org/Ashok%202011. pdf
[12] https://www.ptfarm. pl/pub/File/acta_pol_2011/2.2011/291 - 294. pdf
[13] https://www.researchgate. net/profile/Nandita - Thakur/publication/340477392_Chemical_Composition_Minerals_and_Vitamins_Analysis_of_Lyophilized_Wheatgrass_Juice_Powder/links/5e8c292ea6fdcca789fbf6bd/Chemical - Composition - Minerals - and - Vitamins - Analysis - of - Lyophilized - Wheatgrass - Juice - Powder. pdf
[14] https://pp. bme. hu/ch/article/view/13954/8401
[15] https://www.phytojournal. com/archives/2016/vol5issue1/PartD/5 - 1 - 16. pdf
[16] https://www.researchgate. net/profile/Mukul - Chauhan/publication/332810463_A_pilot_study_on_wheat_grass_juice_for_its_phytochemical_nutritional_and_therapeutic_potential_on_chronic_diseases/links/5ccaf8c492851c8d2215d3e7/A - pilot - study - on - wheat - grass - juice - for - its - phytochemical - nutritional - and - therapeutic - potential - on - chronic - diseases. pdf
[17] https://www.researchgate. net/profile/Ena - Gupta - 2/publication/297403454_Determination_of_Minerals_and_Antioxidant_Activities_at_Different_Levels_of_Jointing_Stage_in_Juice_of_Wheat_Grass_ - The_Green_Wonder/links/56ded0dc08aedf2bf0c9c9c0/Determination - of - Minerals - and - Antioxidant - Activities - at - Different - Levels - of - Jointing - Stage - in - Juice - of - Wheat - Grass - The - Green - Wonder. pdf
[18] https://integrisok. com/resources/on - your - health/2021/august/chlorophyll#: ~: text=The%20best%20and%20easiest%20way, be%20found%20in%20natural%20grocers
[19] https://www.ncbi. nlm. nih. gov/pmc/articles/PMC3876669/#: ~: text=The%20present%20study%20clearly%20concluded, to%20prevent%20diabetic%2Dassociated%20complications.
[20] https://ffhdj. com/index. php/ffhd/article/view/112/235
[21] https://www.luzvida. com/articuloscientificos/Multiples_potenciales_del_wheatgrass. pdf

[22] https://www.researchgate. net/profile/Mukul - Chauhan/publication/332810463_A_pilot_study_on_ wheat_grass_juice_for_its_phytochemical_nutritional _and_therapeutic_potential_on_chronic_diseases/links/5ccaf8c492851c8d2215d3e7/A - pilot - study - on - wheat - grass - juice - for - its - phytochemical - nutritional - and - therapeutic - potential - on - chronic - diseases. pdf
[23] https://www.sciencedirect. com/science/article/abs/pii/S030881462032063X
[24] https://books. google. co. in/books?hl=en&lr=&id=9hgzJA7mPdwC&oi=fnd&pg=PR9&dq=chlorophyll+extraction+from+wheat+grass+research+paper&ots=9RV26VQKm_&sig=1_C6qIP - Lr5TXZ4dl_OsGV7cqTQ#v=onepage&q&f=false
[25] https://www.researchgate. net/publication/277775287_Wheatgrass_Juice_and_its_Nutritional_Value_as_Affected_by_Sprouting_Condition
[26] https://www.frontiersin. org/articles/10.3389/fevo.2018.00064/fullp