UNLOCKING AGRICULTURAL POTENTIAL: AN ECONOMIC ANALYSIS OF TRANSFORMING BARRAN LAND INTO LEAFY GREENS PRODUCTIVE ASSETS

ABSTRACT

Amaranthus, commonly known as amaranth, it is incredibly nourishing, abundant in calcium, iron, magnesium and potassium as well as vitamins (A, C and folate), fiber, protein and minerals. It is a significant supplement to diets because it offers a balanced array of critical nutrients, particularly in areas where malnutrition is common. Amaranth has a high nutritional content and is therefore very beneficial to health. It might improve heart health by lowering inflammation, cholesterol, and blood pressure. Its high fiber content also helps to maintain digestive health and may helpwithweightmanagement.This researchstudy was carried out to estimate proximate is made about calculating the benefit cost ratio of greens cultivated in a barren land of total areaabout 22cents in which five types of green vegetables were cultivated. The benefit cost ratio of this study is appeared to be 1:1.44whichdenoted that the production of green vegetables in a barren land was resulted as beneficialand profitable.We summarized the chemical makeup of spinach, its health benefits, its relative safety, and its suggested dietary inclusion in this review article, which is was based on data compiled from our labs and those of other researchers.

Keywords: Green vegetables, Spinach, Nutrition, Spinach,Net income,Grossincome.

INTRODUCTION

Amaranth is a member of the *Amaranthus* genus, which is part of the Amarantaceae family and has 70species spreadthroughout tropical andsubtropical regions.Itis aC4 photosynthetic plantspecies that isvery productive, has a high genetic diversity and can adapt to a variety of soil and weather conditions,particularlydrysoilsandhightemperatures.Amaranthspecies,including*Amaranthusviridis*,*A. dubiusand A. tricolor* have been extensively researched for their nutritional value in seeds and vegetables. There is aglobal need to find more affordable and easily obtainable food options in order to enhance the nutritionalstatus of the populace (**Beattie, JamesHerbert,1948**) In particular, there is a need to find new andhigh-quality protein sources that are notderived from animals or conventional grains. The selected greens (green vegetables) are mainly consumed for its their leaf and stem parts. These greens can be made in to different kinds of used as various sabzis (cooked vegetables) and can be consumed along with dal, rice, rotietc. , Apart from this, these it can also be consumed as salads. The average cooking time for greens is about 3 – 4 minutes. In this instance, the main objective of this study is to find out the yield of different Amaranthusspeciescultivatedina22centsoflandwhichislocatedinasemi-aridregionofViradhunagardistrict.In biological systems, spinach leaves, which have a number of active ingredients, including flavonoids, which have antioxidative, antiproliferative, and anti-inflammatory effects. Numerous positive effects, including anticancer and antiaging properties as well as protection of the central nervous system and chemotherapy, have been shown for spinach extracts (**Lomnitski, L *et.al.*, 2003**).In India, Maharashtra, West Bengal, Gujarat, Andhra Pradesh, Telangana, Kerala, Tamil Nadu, Karnataka, and Uttar Pradesh are the states that produce the most spinach. The main objective of this study was to find out the yield of different Amaranthus species.

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Comment [A6]: Give source and some examples of common vegetables falling under amaranth.

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METHODOLOGY

Related to Swiss chard and beets, spinach is a vegetable for cool weather. During the mild spring and fall temperatures, this quickly spreading plant produces a large number of leaves in a short period of time. It's important to extend the life of spinach plants when growing them, particularly in the spring when longer days cause them to wither. Five green vegetables, under the group amaranth, were selected and taken as the five treatments for the study based on ~~The varieties which have been cultivated in the selected 22 cents of area are Indian spinach, greenamaranth,Chineseamaranth,SpinachandSessilejoyweed. Thesearethevarietieswhichhavebeenselected according to the~~ environmental and climatic conditions of the area chosen. Botanical and nutritive descriptions of the five vegetables are given below (Table 1). ~~These are easily grownandlow-cost maintenancevarieties.~~

Result and Discussion

Table 1. ~~Nutritionalvalueofselectedgreens~~ Botanical and nutritive descriptions of the five green vegetables.

S. No.	Botanicalname	Family	Common name	Local name	Nutritional value and uses
1	*Amaranthus dubius*	Amaranthaceae	Indian spinach	Araikeerai	Provides proteins,fibers, calcium, iron,riboflavin,niacinandvitamin C and is anexcellentsourceof lysin.
2	*Amaranthus viridis*	Amaranthaceae	Green amaranth	Thandukerai	A decoction of theentireplantisusedtostop dysentery andinflammations andalsoto purify the blood.
3	*Amaranthus tricolor*	Amaranthaceae	Chinese spinach	Sigapputhandukeerai	The roots of redspinach are used as aremedyfordysentery.It is highlyrecommendedforconsumption bypatients with coloncancer, diabetesmellitus, highbloodcholesterol
4	*Spinacia oleracea*	Amaranthaceae	Spinach	Palakkeerai	It can help supportimmune function, aid the digestive system,may even haveanticancerproperties.
5	*Alternanthera sessilis*	Amaranthaceae	Sessile joy weed	Ponnanganikeerai	Totreathepatitis,tightchest, bronchitis,asthmaandotherlung troubles.

(Source: **Priyanka, ~~T.,~~*et.al.*, 2021**)

The land measurement is taken for 22 cents and the total area is 890.12 sq.m and for each variety ofgreens different plot of land were divided. ~~The primary tillage practice of~~ ploughing has been undergone 2timeswith rotavatorfor thefinetilth ofsoilalong with250kg ofFYMandplotsweredivided forsowing.All four spinach species were ~~is~~ direct seeded by broadcasting expect for sessile joy weed which ~~is~~ was planted using cuttings ~~and for allother greens~~ for broadcasting, ~~of~~ seeds were mixed with sand in 1:10 ratio ~~of seeds and sand was mixed~~for easy and uniform sowing. The sessile joy weed cuttingswere planted with a

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Comment [A16]: Give layout and design of the field, area per plot, total treatments and replications etc. Give Methodology properly in chronology.

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spacing of 12 cm x 15 cm. ~~After sowing and plantation~~ immediately after planting light ~~fe~~ irrigation was given and then ~~irrigation was donein~~ at weekly intervals. Since spinach's roots are comparatively shallow, it benefits from frequent, brief irrigations that keep the soil consistently moistfor optimal ~~\~~leaf formation. Nonetheless, it's important to avoid overwatering spinach because it might become overly saturated, especially in areas with dense soil. Give dates of each activity, e.g. sowing time, harvesting time etc. Did not you use chemical fertilizers at all??

Table 2. Seed rate and crop duration of five green vegetables.

~~**Detailsonselectedgreensseedrate,durationand harvestingtime**~~

S. No.	Particulars	Indianspinach	Greenamaranth	Chinesespinach	Spinach	Sessile joyweed
1	Scientific name	*Amaranthus dubius*	*Amaranthus viridis*	*Amaranthus tricolor*	*Spinacia oleraca*	*Alternanthera sessilis*
2	Seed/cutting rate per plot?	50g	50g	50g	50g	80cuttings
3	Propagation	Seed	Seed	Seed	Seed	Cuttings
4	Harvest	25-30 DAS	20–45 DAS	30 DAS	45 DAS	35–40 DAS

DAS = give full form

(**Waseem.,*etal*.,2001**)

Harvesting and ~~handling~~estimation of cost of cultivation

Selected5varietiesofgreenshavebeenharvestedindifferentintervalsoftime. Theplants were ~~i~~smanually chopped off just below the crown, knotted into bunches of eight to twelve, and packed twenty-fourof these bunches or a minimum of twenty per gunny bag. These bags we~~a~~re weighed and ~~are~~ marketed in local retail shops. Harvesting in proper interval of time is very important because if the harvesting gets delayed itmayresult in flowering and which leads to yield loss.Longer growing seasons are given to spinach, resulting in noticeably larger and thicker leaves. After a field has been trimmed, the plants grow again and may be harvested a second or thirdtime.

RESULTS

Table 3. Common Cost of Cultivation and income of ~~selected greens~~five green vegetables.

S. No.	Particulars	Unit	Quantity	Rates (Rs.)	Amount (Rs.)
1	Seed	Rs./Kg	50g	250	750/-
2	Landpreparation	Rs./hr	1hr	1000/-	1000/-
3	Basalapplication (FYM)	Rs./Kg	50kg	10/kg	500/-
4	Sowingand Transplantation charge	Rs.	5 Labours	200/labour	1000/-
5	Fertilizer(Urea)	Rs./Kg	13kg	242/-	242/-
	~~YIELD~~ Income				

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7	Indianspinach	Rs./Kg	~~100~~ 15	1005	1,500/-
8	Greenamaranth	Rs./kg	100	15	1,500/-
9	Chinesespinach	Rs.	120	15	1,800/-
10	Spinach	Rs.	150	15	2,250/-
11	Sessile joy weed	Rs./Kg	100	15	1,500/-
	Total~~yield~~income Rs.	~~Rs./Kg~~	~~570~~	-	8,550/-
	Cost of cultivation (COC)	-	-	-	**3,492/-**
	Gross income	-	-	-	**8,550/-**
	Net income (NI)	-	-	-	**5,058/-**
	Economic B:C ratio (NI/COC)				**???**

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~~That~~ the gross returns obtained in 22 cent was Rs.8,550/- based on yield of good quality marketableleaves. With respect to net returns, it was Rs.3,492/-. Thus, cultivation of green leafy vegetables in the studyarea was found to be profitable as revealed by the net returns. The ~~analysis~~ values of costs and returns ~~and cost~~ were used tocompute the benefit cost ratio and it resulted into a profitable benefit cost ratio in respect of all the greens.The magnitude of economic B:C ratio was 1:1.44 there by indicated higher returns for every rupee invested in thegreens production in the study area. ~~The average yield is 570kg and the gross income is Rs.8,550/- for thetotal area of 22cents.~~This study revealed ~~s~~ that cultivation of selected amaranths is profitable even in a small area of land of 863 sq. m. area~~low amount of investment is convenient for a good amount of profit in less than 1acre of land.~~

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~~Table4. Cost andReturns ofGreens~~

~~S.No.~~	~~PARTICULARS~~	~~Unit (Rs)~~
~~1~~	~~Costof cultivation~~	~~3,492/-~~
~~2~~	~~Averageyield~~	~~570kg~~
~~3~~	~~Grossreturns~~	~~8,550/-~~
~~4~~	~~Netreturns~~	~~3,492/-~~
	~~Benefitcostratio~~	~~1.44~~

Greens offer notable socioeconomic advantages, particularly in tropical and subtropicalareas where women predominantly cultivate and harvest green leafy vegetables to boost household income.In rural regions, traditional leafy vegetables serve as a vital source of nutrition, being available year-round and offering an affordable supply of vitamins and micronutrients to address nutritional deficiencies. These vegetables also provide a variety of phytochemicals like rutin and ~~is~~ quercitrin, which have substantial applications in daily diets and industries, as well as in the medical field.

CONCLUSION

Greens (selected amaranths) hold significant potential as a sustainable crop that can enhance household foodsecurity and boost farmers' income. In arid areas where commercial crops like maize, beans and rice struggle to grow, greens cultivation can play a key role in achieving the first

Millennium Development Goal of reducing hunger and poverty. Thus, greens cultivation presents a promising avenue for supporting economic development and food sustainability. ~~The total yield is 570kg and the total income is Rs.8,550/-,~~the benefit cost ratio of the selected green vegetables ~~is~~was 1:1.44, since the B:C ratio ~~is~~ was greater than 1 the production is considered to be ~~beneficialand~~ profitable.

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