STRENGTHENING THE LAW OF RETURN FOR SUSTAINABLE LIVELIHOODS OF THE HIMALAYAN COMMUNITIES

VANDANA SHIVA
VAIBHAV SINGH
VINOD BHATT
DARWAN SINGH NEGI

HEALTH PER ACRE

ORGANIC MIXED CROPPING VERSUS CONVENTIONAL MONO CROPPING

- IMPERATIVE TO CALCULATE NUTRITION PRODUCED PER ACRE
- CONVERSION OF YIELD PER ACRE DATA INTO NUTRITION PER ACRE DATA
- CALCULATION OF AVERAGE NUTRITION
- PROJECTION OF RESULTS NATIONALLY

YIELD PER ACRE IN CASE STUDY 1

ORGANIC MIXED CROPPPING VS CONVENTIONAL MONOCROPPING

ORGANIC MIXED CROPPING	CONVENTIONAL MONO CROPPING
MAIZE: 4 QT	MAIZE: 5 QT
RADDISH: 2 QT	
MUSTARD LEAVES: 100 BUNDLES	
PEAS: 2 QT	
TOTAL: 9 QT	TOTAL: 5 QT

CONVERSION OF YIELD PER ACRE INTO NUTRITION PER ACRE IN CASE STUDY 1

NUTRITENTS	ORGANIC MIXED CROPPING	CONVENTIONAL MONO CROPPING
PROTEIN	64.2 kg	55.5 kg
CARBOHYDRATE	304.0 kg	331 kg
FAT	17.2 kg	18 kg
ENERGY	1622000 kcal	1710000 kcal
CAROTENE	3154 mg	450 mg
THIAMINE	2330 mg	2100 mg
RIBOFLAVIN	460 mg	500 mg
NIACIN	9800 mg	9000 mg
VIT B6	-	-
FOLIC ACID	80 mg	100 mg
VIT C	81000 mg	0 mg

CONVERSION OF YIELD PER ACRE INTO NUTRITION PER ACRE IN CASE STUDY 1

NUTRIENTS	ORGANIC MIXED CROPPING	CONVENTIONAL MONO CROPPING
CALCIUM	305 g	50 g
IRON	29.3 g	11.5 g
PHOSPHOROUS	1740 g	1740 g
MAGNESIUM	626 g	695 mg
SODIUM	145.2 g	79.5 g
POTASSIUM	1878 g	1430 g
COPPER	6420 mg	2050 mg
MANGANESE	3030 mg	2400 mg
MOLYBDENUM	790 mg	190 mg
ZINC	14240 mg	14000 mg
CHROMIUM	48 mg	20 mg

AVERAGE NUTRITION PER ACRE ACROSS 12 CASE STUDIES

ORGANIC MIXED CROPPING VERSUS CONVENTIONAL MONO CROPPING

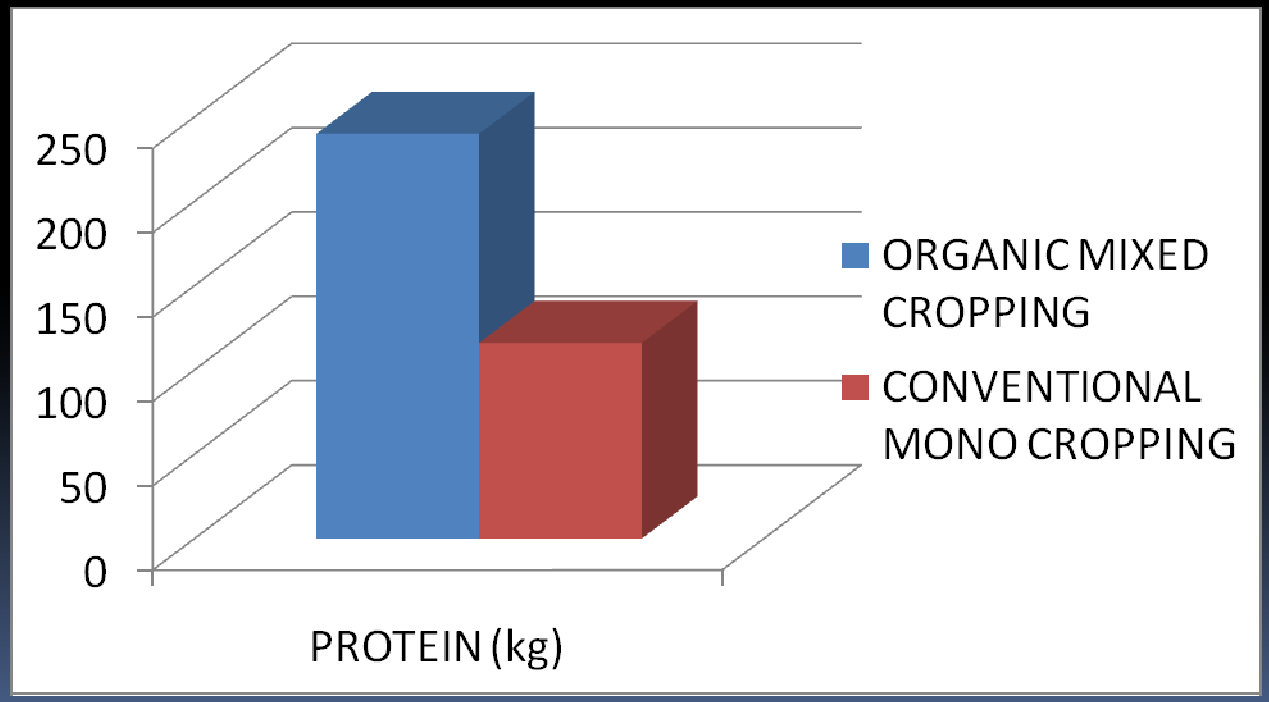
NUTRIENTS	ORGANIC MIXED CROPPING	CONVENTIONAL MONO CROPPING
PROTEIN	240 kg	116 kg
CARBOHYDRATE	833 kg	785 kg
FAT	66 kg	23 kg
ENERGY	4914270 kcal	3711475 kcal
CAROTENE	2919 mg	745mg
THIAMINE	6550 mg	3911 mg
RIBOFLAVIN	3179 mg	1685 mg
NIACIN	31443 mg	28381 mg
VIT B6	821 mg	475 mg
FOLIC ACID	878 mg	328 mg
VIT C	24145 mg	36833 mg

AVERAGE NUTRITION PER ACRE ACROSS 12 CASE STUDIES

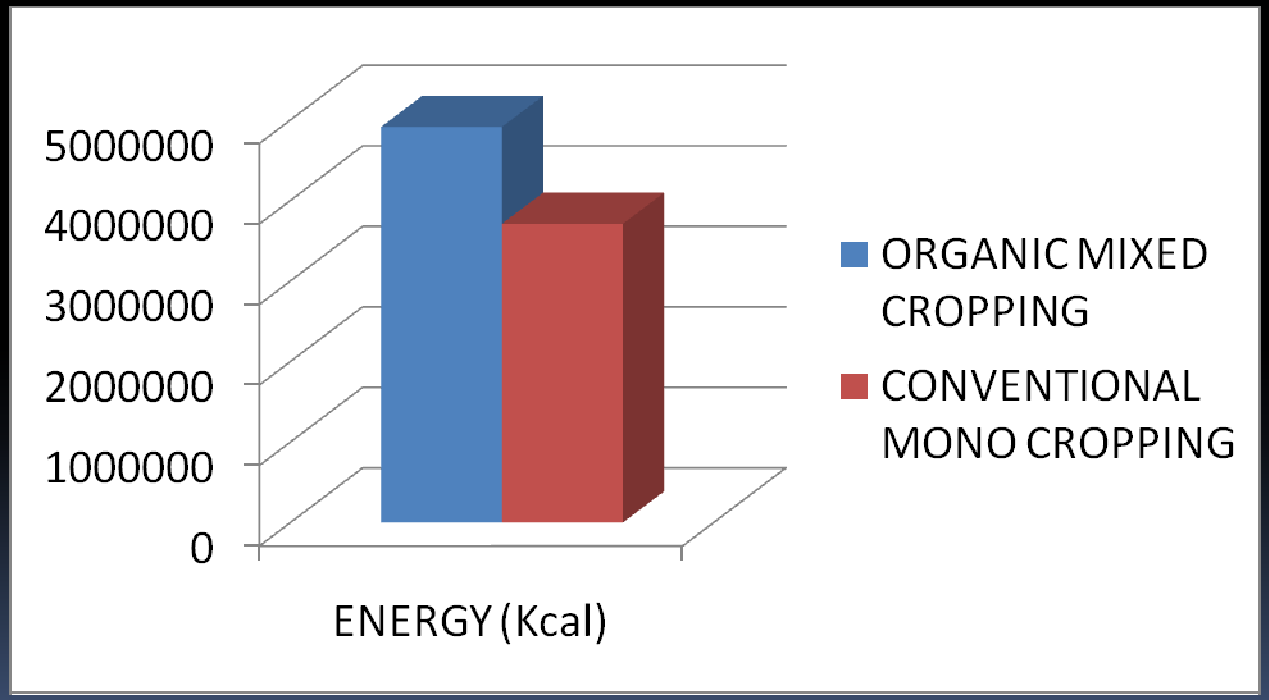
ORGANIC MIXED CROPPING VERSUS CONVENTIONAL MONO CROPPING

NUTRIENTS	ORGANIC MIXED CROPPING	CONVENTIONAL MONO CROPPING
CALCIUM	2166 mg	731 mg
IRON	82 g	43 g
PHOSPHOROUS	5158 g	3117 g
MAGNESIUM	1866 g	1496 g
SODIUM	197 g	158 g
POTASSIUM	6076 g	3465 g
COPPER	12591 mg	6101 mg
MANGANESE	25124 mg	15629 mg
MOLYBDENUM	3694 mg	1077 mg
ZINC	43977 mg	26769 mg
CHROMIUM	345 mg	157 mg

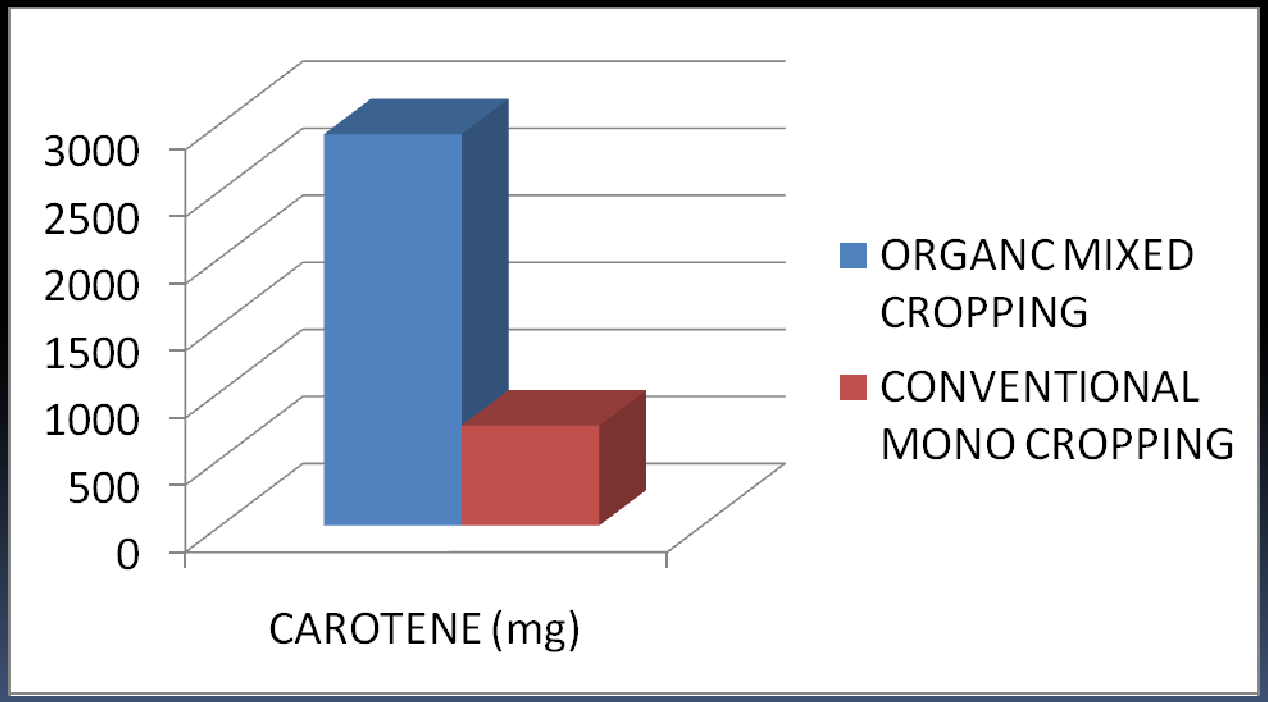
PROTEIN PER ACRE



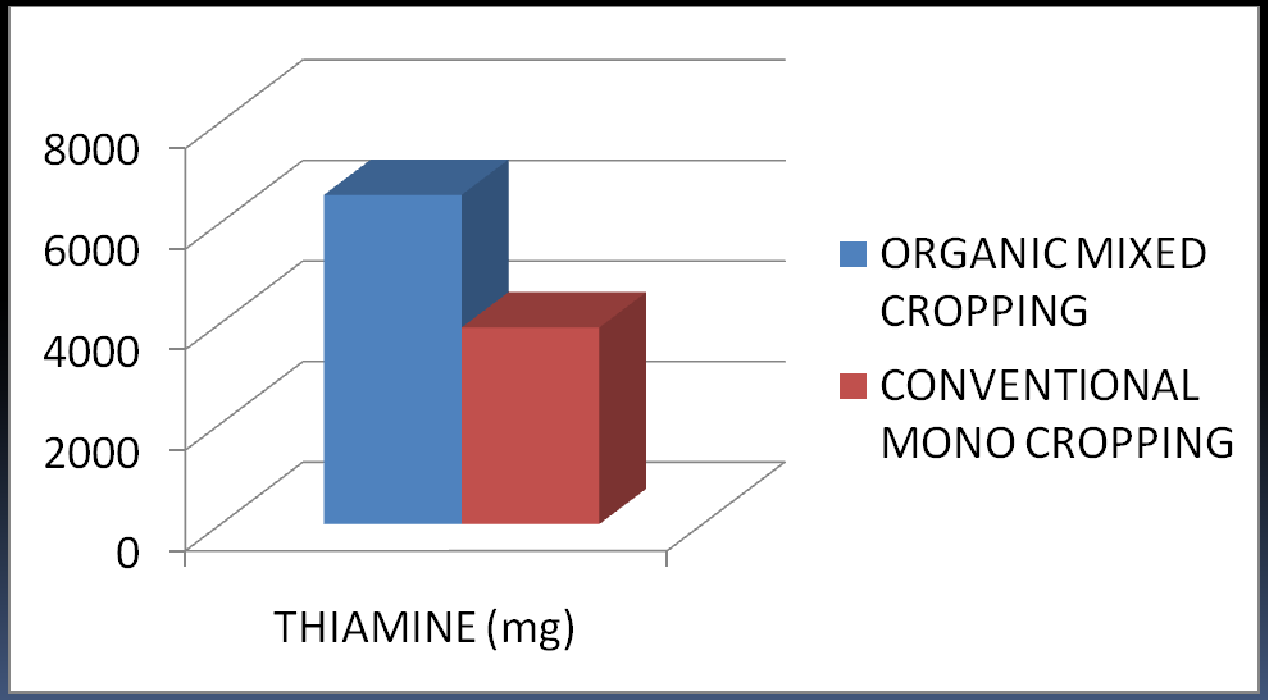
ENERGY PER ACRE



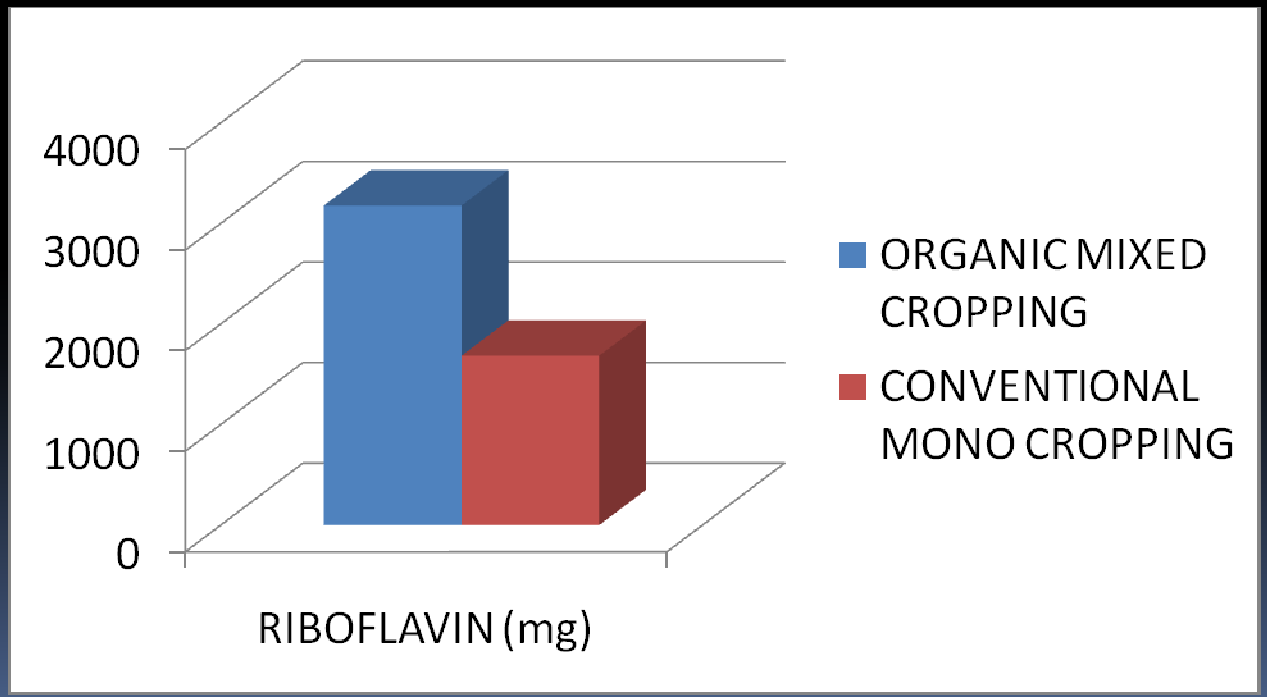
CAROTENE PER ACRE



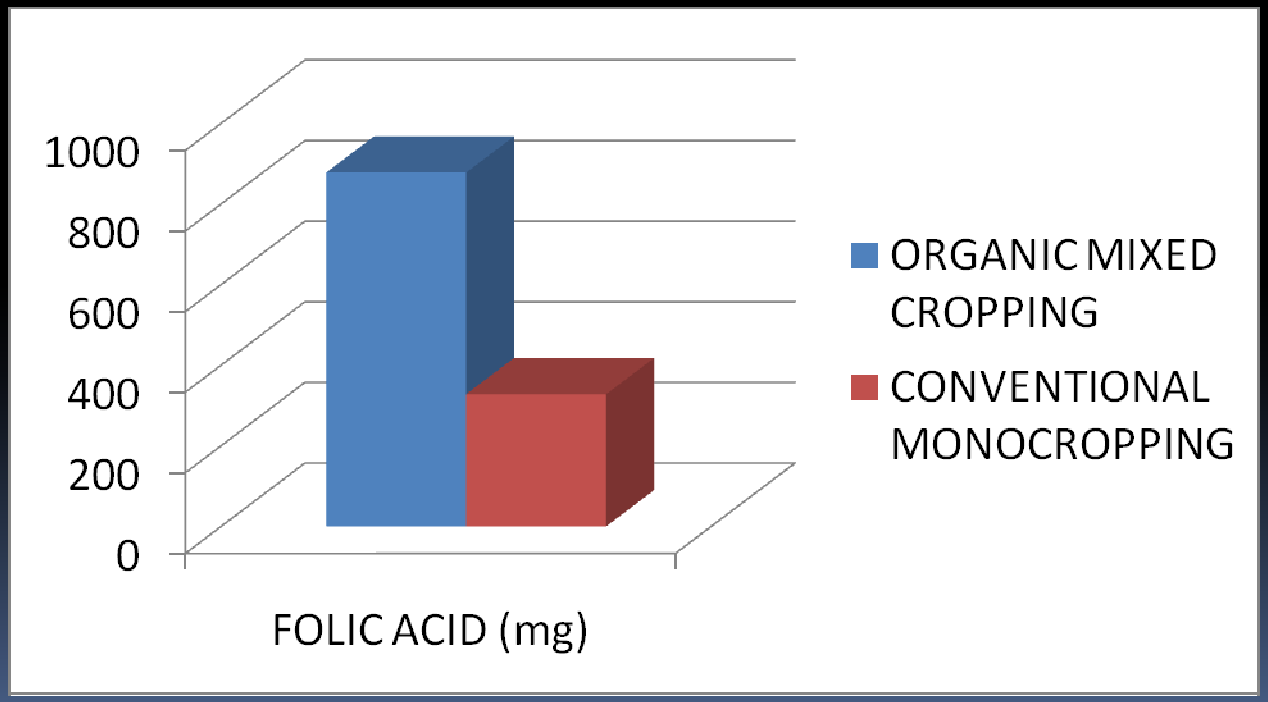
THIAMINE PER ACRE



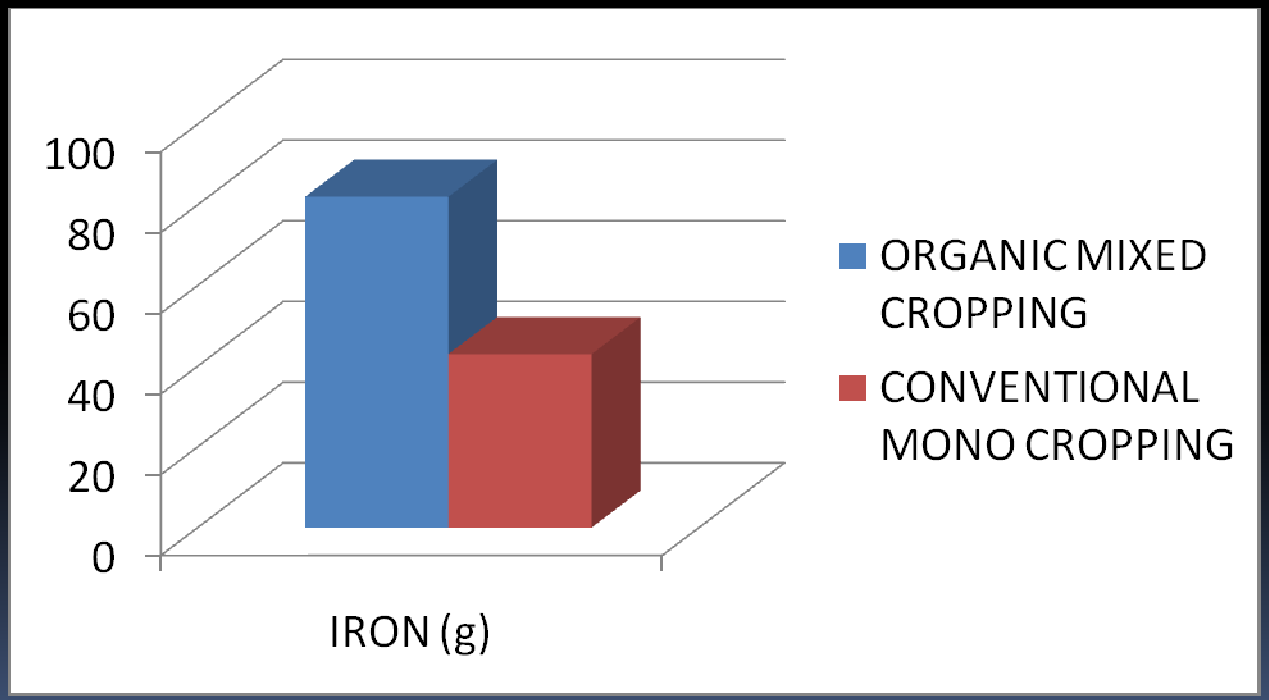
RIBOFLAVIN PER ACRE



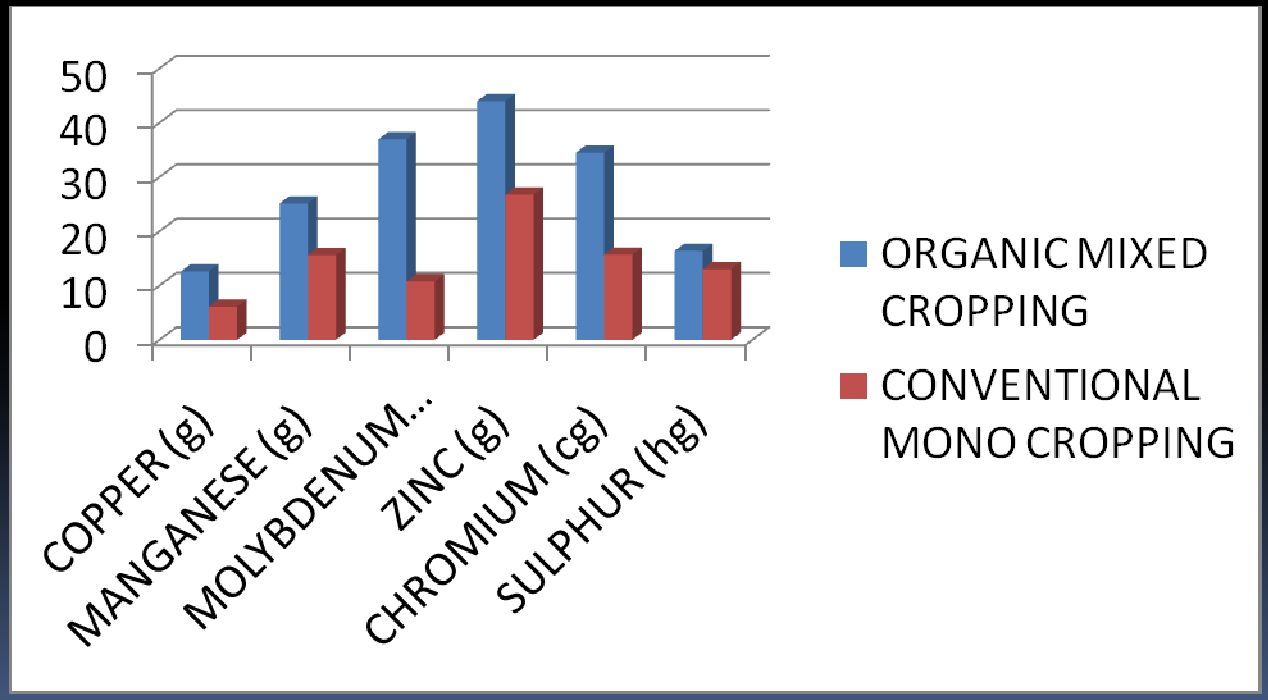
FOLIC ACID PER ACRE



IRON PER ACRE

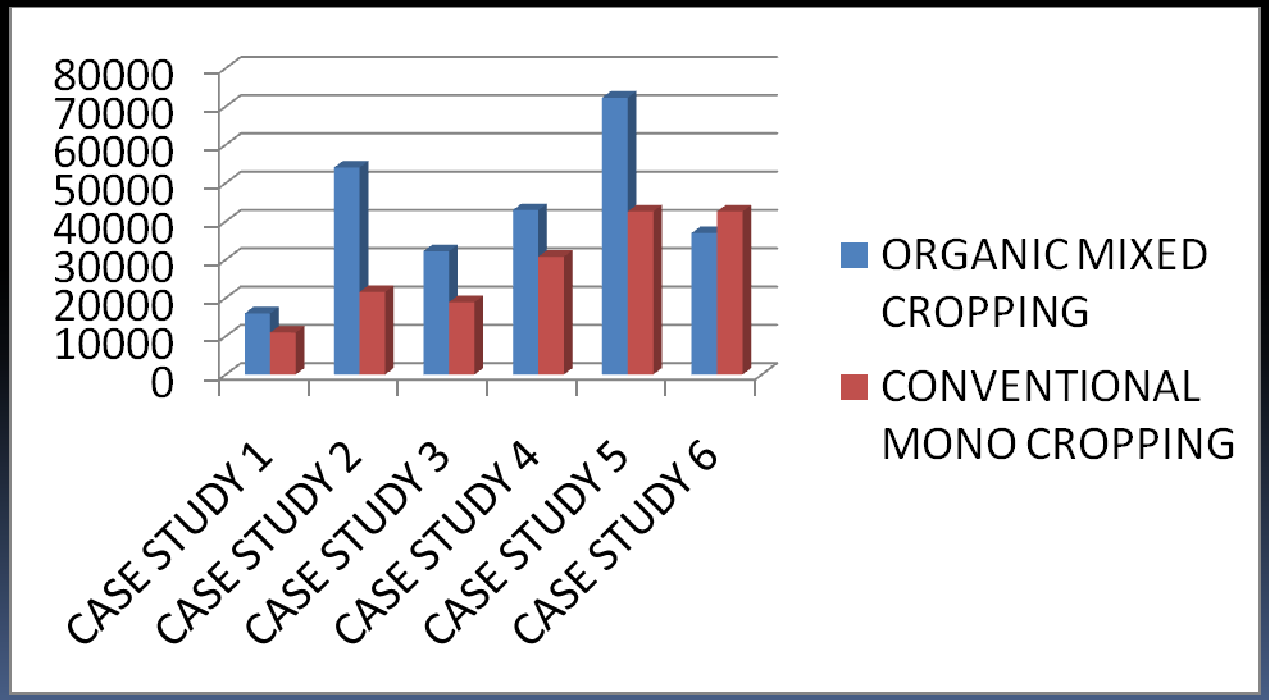


TRACE ELEMENTS PER ACRE

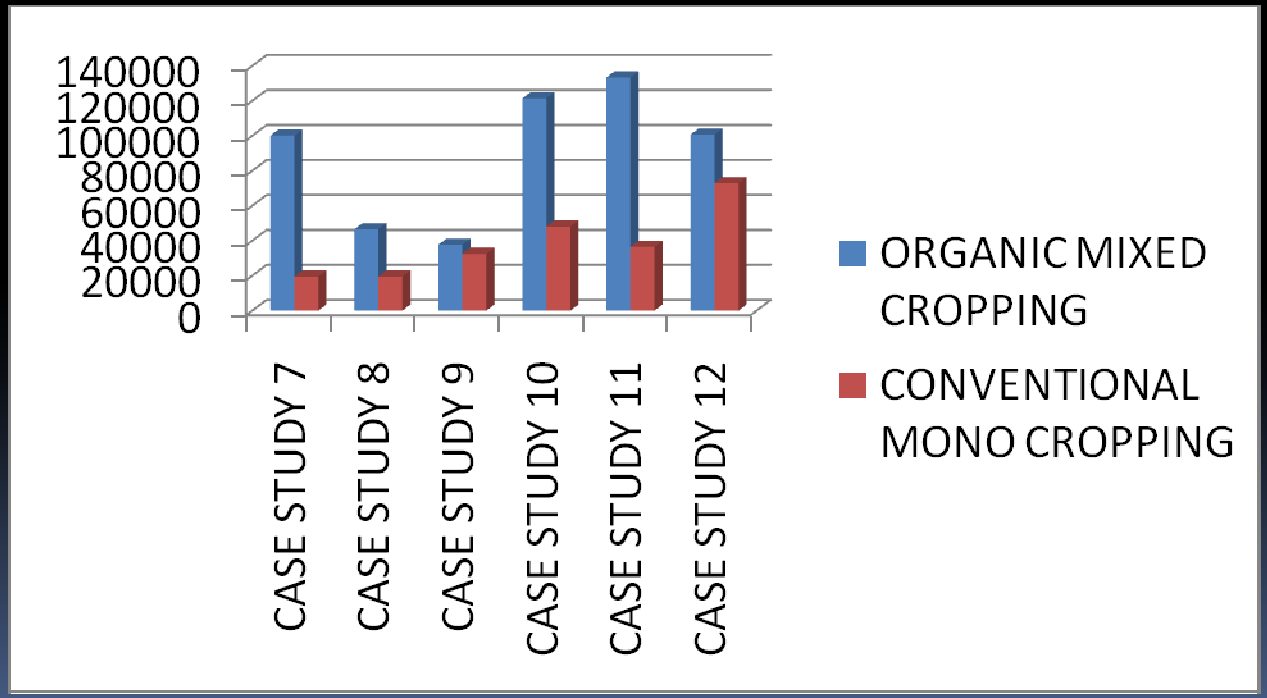


CASE STUDY NUMBER	REVENUE GENERATED IN ORGANIC MIXED CROPPING (INR)	REVENUE GENERATED IN CONVENTIONAL MONO CROPPING (INR)
CASE STUDY 1	16000	11000
CASE STUDY 2	54100	21600
CASE STUDY 3	32220	18900
CASE STUDY 4	42950	30800
CASE STUDY 5	72350	42600
CASE STUDY 6	36950	42600
CASE STUDY 7	100100	19500
CASE STUDY 8	46500	19500
CASE STUDY 9	37700	32500
CASE STUDY 10	121423	48092
CASE STUDY 11	133385	36450
CASE STUDY 12	100690	72900
AVERAGE REVENUE GENERATED ACROSS 12 CASE STUDIES	66197	33037

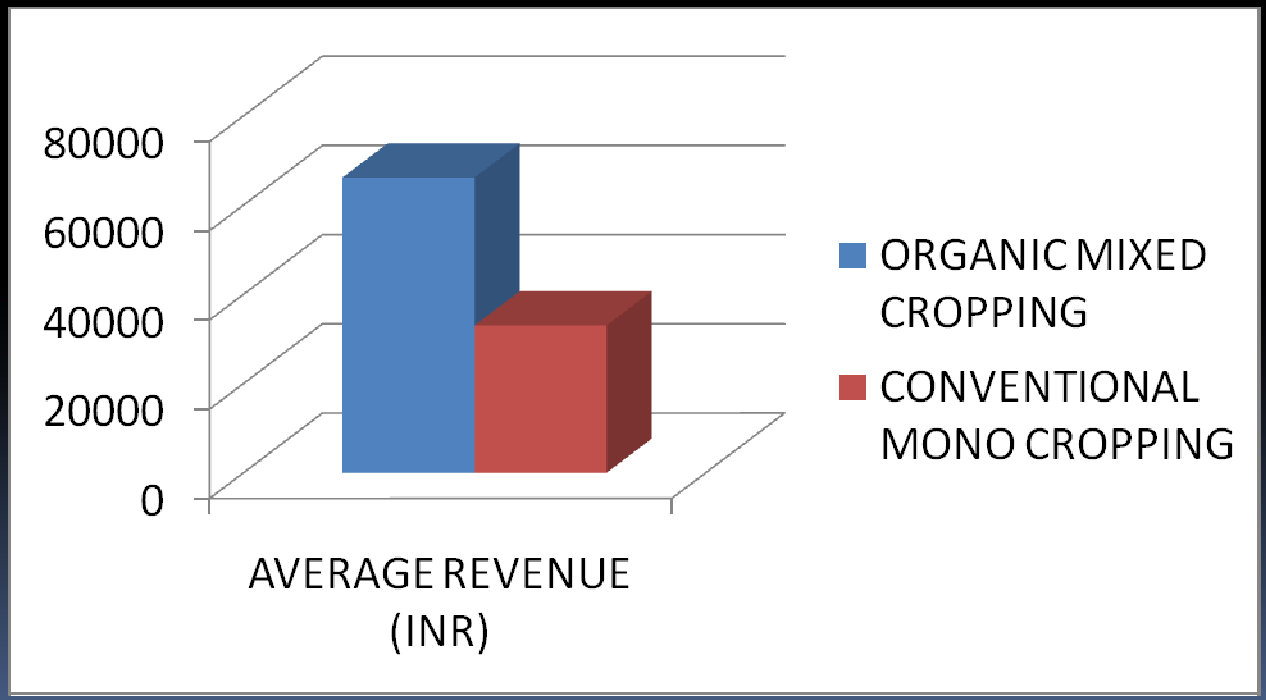
REVENUE PER ACRE



REVENUE PER ACRE



AVERAGE REVENUE



OCCUPATIONAL DISEASES ASSOCIATED WITH USE OF AGRI-CHEMICALS

➢ SKIN RASH AND CHRONIC DERMATITIS	➢ LEUKEMIA
➢ BURNING EYES, BLINDNESS	➢ MULTIPLE MYELOMA
➢ SHORTNESS OF BREATH	➢ SARCOMAS
➢ EPISTAXIS	➢ PROSTATE CANCER
➢ PAIN IN STOMACH, MUSCLES, JOINTS, OR BONES	➢ PANCREATIC CANCER
➢ MEMORY LOSS, MENTAL ILLNESS	➢ LUNG CANCERS
➢ HEADACHE	➢ BREAST CANCERS
➢ PTERYGIUM	➢ TESTICULAR CANCERS
➢ POLYNEUROPATHY	➢ HODGKIN'S LYMPHOMA
➢ KIDNEY DISEASES	➢ LIVER AND KIDNEY CANCERS
➢ ABORTIONS, STILL BIRTHS, NEONATAL DEATHS	➢ RECTAL CANCERS
➢ CONGENITAL DEFECTS, & MENTAL RETARDATION	➢ STOMACH CANCERS
➢ NON-HODGKIN'S LYMPHOMA	➢ ENDOMETRIAL CANCERS

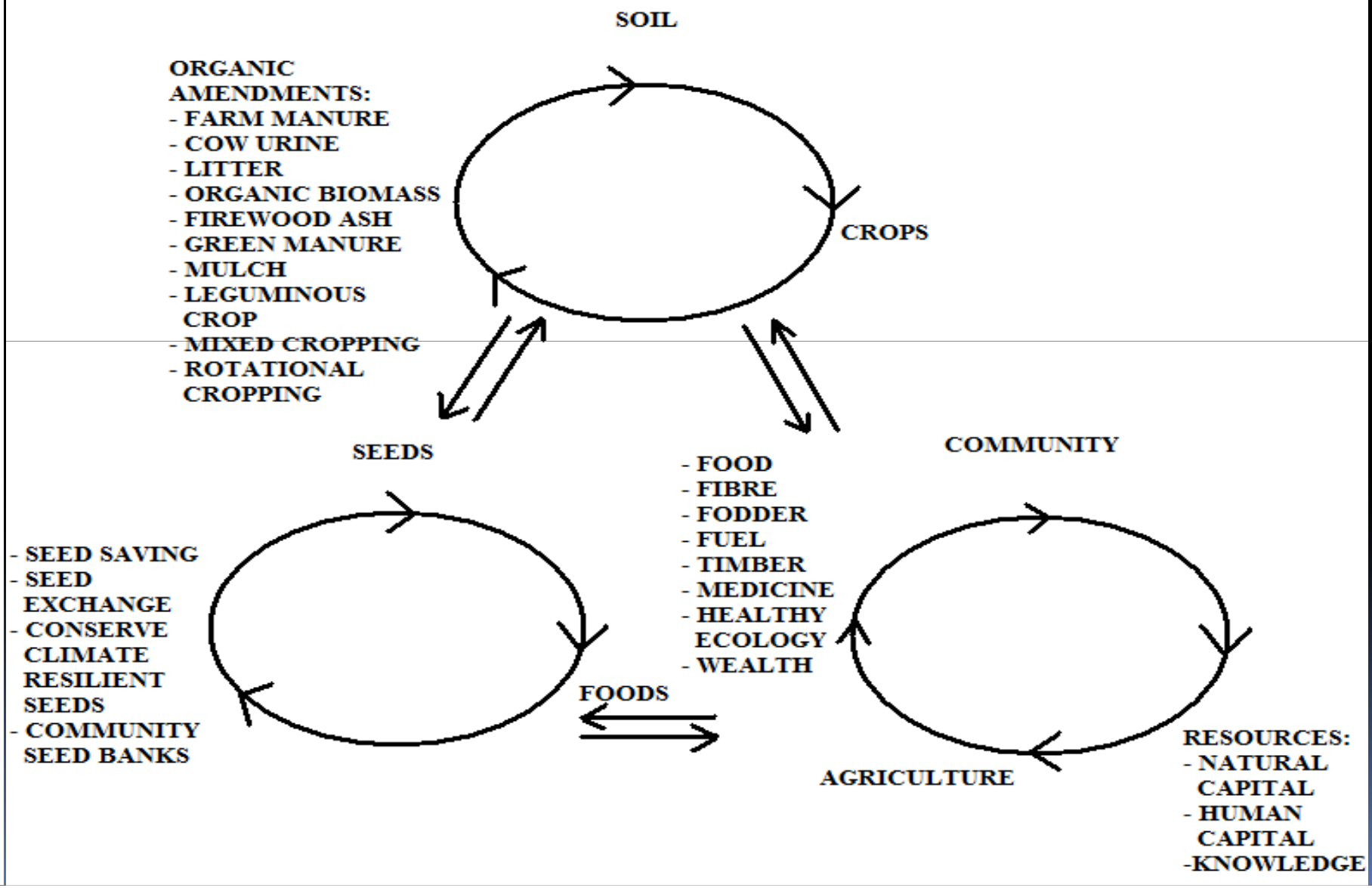
NEGETIVE EXTERNALITIES ASSOCIATED WITH CONVENTIONAL AGRICULTURE

- Loss of species
- Loss of biodiversity
- Bee colony collapse syndrome
- Depletion of soil microorganism
- Desertification of land
- Salinization of land
- Destruction of river and ocean ecosystem
- Creation of dead zones in the ocean
- Creation of super pests and super weeds
- Global warming
- Deterioration of public health due to residues of agri-chemicals in the environment

POSITIVE EXTERNALITIES ASSOCIATED WITH ECOLOGICAL AGRICULTURE

- INCREASED CARBON SEQUESTRATION
- BIODIVERSITY CONSERVATION AND PROMOTION
- DECREASED HEALTH HAZARDS DUE TO ELIMINATION OF HARMFUL CHEMICALS
- CONSERVATION OF NATURAL ECOSYSTEMS
- CONSERVATION OF SCARCE RESOURCES
- DIVERSIFIED NUTRITION TO THE SOCIETY
- PROMOTION OF PUBLIC HEALTH THROUGH INCREASED PRODUCTION OF GOOD QUALITY NUTRITION

LAW OF RETURN



TRAITS OF A SOVEREIGN SOCIETY

- SEED SOVEREIGNTY
- FOOD SOVEREIGNTY
- SUSTAINABLE LIVELIHOODS
- ECOSYSTEM PROTECTION AND PROMOTION
- COMMUNITY HEALTH
- COMMUNITY WELFARE AND PROSPERITY
- FAIR TRADE PRACTICES
- EFFICIENCY
- EQUITY
- EARTH DEMOCRACY

ECONOMIC ANALYSIS OF GROWING HYBRID RICE COMPARED TO ORGANIC DEHRADUNI BASMATI

HYBRID RICE

INPUTS PER HECTARE	NOMINAL COST (2000-01) IN INR	REAL COST (ADJUSTED FOR INFLATION TILL 2013) IN INR
SEEDS	1715.98	8892.00
FARM YARD MANURE	1205.20	3083.58
CHEMICAL FERTILIZERS	2396.98	6132.82
IRRIGATION	1949.91	4988.96
PLANT PROTECTION	630.68	1613.63
HUMAN LABOR	7711.53	19730.41
MACHINE LABOR	1623.42	4153.62
MISCELLANEOUS	656.10	1678.67
TOTAL	17889.80	50273.69

HYBRID RICE

OUTPUT PER HECTARE	NOMINAL VALUE (2000-01) IN INR	REAL VALUE (ADJUSTED FOR INFLATION TILL 2013) IN INR
VALUE OF 8.41 TON OF PADDY PRODUCED PER HA	45598.18	116665.68
VALUE OF STRAW	2138.08	5470.41
GROSS REVENUE	47736.26	122136.09
NET PROFIT IN 2013 INR	29846.46	71862.40

ORGANIC DEHRADUNI BASMATI

MUKUNDI LAL VILL: BHUDDI SIZE:1BIGHA(900 sq yd)	Quantity	Total (Rs.)
Costs for field preparation*		
Ploughing Cattle	Four times	---
Ploughing by tractor		700*
Diesel	5 litre	300
Seeds	2.50kg	125*
Nursery Sowing	1 man day	200*
Transplantation including nursery uprooting	3 man days	450*
Irrigation	4 - 6 hours	400*
Chemical Fertilizers	Nil	
Other Fertilizers (FYM etc.)	1 trolley or 10-12 qtl	1000*
Pesticides and weedicides		Nil
Weeding	1 man day	150*
Harvesting	2 man days	300*
Threshing, winnowing etc.	3 man days	450*
Total cost in Production		**4375**

ORGANIC DEHRADUNI BASMATI

Transportation and labour Cost		**200***
Other costs (if any?)	Gunny bags (04)	100
Total expenditure per Farm		**Rs 4675**
Total Expenditure per Hectare		**Rs 58437.5**
Total Production		
Grains	230kg @ Rs 46	10580
Straw	300kg@Rs 4	1200
Other (weeds)	200 kg x 2	400
Marigold	36 plants	1000
Gross income per Farm		**Rs 13180**
Net income per Farm (Gross income- Total expenditure)		**Rs 8505**
Gross Income per Hectare		**Rs 164750**
Net Income per Hectare		**Rs 106312.5**

BASMATI FIELD

BASMATI VARIETIES

PADDY STRAW STORED AS FODDER

ECONOMIC ANALYSIS OF GROWING SOYBEAN COMPARED TO NATIVE ORGANIC KIDNEY BEANS (RAJMA)

SOYBEAN

TYPE OF INPUT	AMOUNT OF INPUT
LAND PREPARATION	ONE SUMMER PLOUGHING WITH TWO PLOUGHING WITH 35 HP TRACTOR DRAWN CULTIVATOR
FERTILIZER/MANURE	5 TON/HA OF FARMYARD MANURE, 30 KG/HA N, 60 KG/HA P_2O_5, 30 KG/HA K_2O
SOWING	BY TRACTOR DRAWN SEED DRILL WITH SEED RATE OF 80 KG/HA
WEEDING AND THINNING	MANUAL LABOR
IRRIGATION	RAINFED
PLANT PROTECTION	CHEMICAL CONTROL BY SPRAYING PHOSPHAMIDON 85% EC AT 0.02%
HARVESTING	MANUAL
THRESHING	BY 35 HP TRACTOR DRIVEN THRESHER

SOYBEAN

SOY BEAN	NOMINAL VALUE (2000-01) IN INR	REAL VALUE (ADJUSTED FOR INFLATION TILL 2013) IN INR
GROSS COST OF PRODUCTION PER HA	10924.00	27949.70
GROSS RETURN FROM ECONOMIC PRODUCT PER HA	7905.00	20225.42
GROSS RETURN FROM BY PRODUCTS PER HA	4138.00	10587.32
TOTAL RETURN PER HA	12043.00	30812.74
NET PROFIT IN 2013 INR	1119.00	2863.03

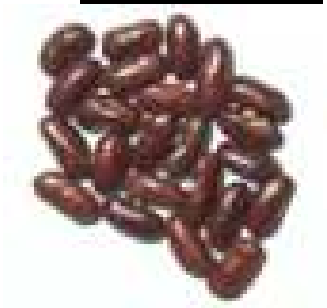
KIDNEY BEANS (RAJMA)

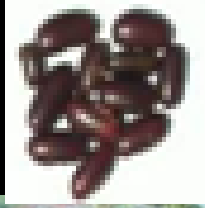
MOHAN SINGH VILL:POKHRI, CHAKRATA SIZE: 15 NALI(1 NALI=200 sq m)	Quantity	Total (Rs.)
Costs for field preparation*		
Ploughing Cattle	2	2000
Seeds	50kg	4500
Irrigation	Nil	
Chemical Fertilizers	Nil	
Other Fertilizers (FYM etc.)	100qtl	7000*
Pesticides and weedicides		Nil
Weeding	20 man days	4000*
Harvesting	10 man day	2000*
Threshing, winnowing etc.	5 man days	10000*
Total cost in Production		**29500**
Transportation and labour Cost		1000*
Other costs (if any?)	Gunny bags (20)	400

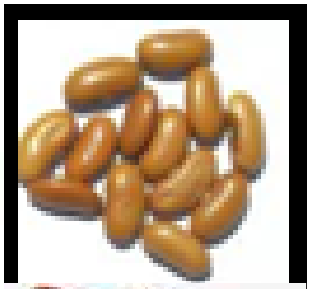
KIDNEY BEANS (RAJMA)

Total Expenditure per Farm		Rs 30900
Total Expenditure per Hectare		**Rs 102998.97**
Total Production		
Grains	1000kg @ Rs 95	**95000**
Straw	2000kg@Rs 2	4000
Other (weeds)	1000 kg x 2	2000
Mandwa	100 x 15	1500
Chaulai	110 x 50	5500
Maize	80x 20	1600
Other Straw	800 x 2	1600
Gross Income per Farm		**111200**
Net income per Farm (Gross income- Total expenditure)	**111200 - 30900**	**Rs 80300**
Gross Income per Hectare		**Rs 370666.67**
Net Income per Hectare	**80300/15x50**	**Rs 267666.67**

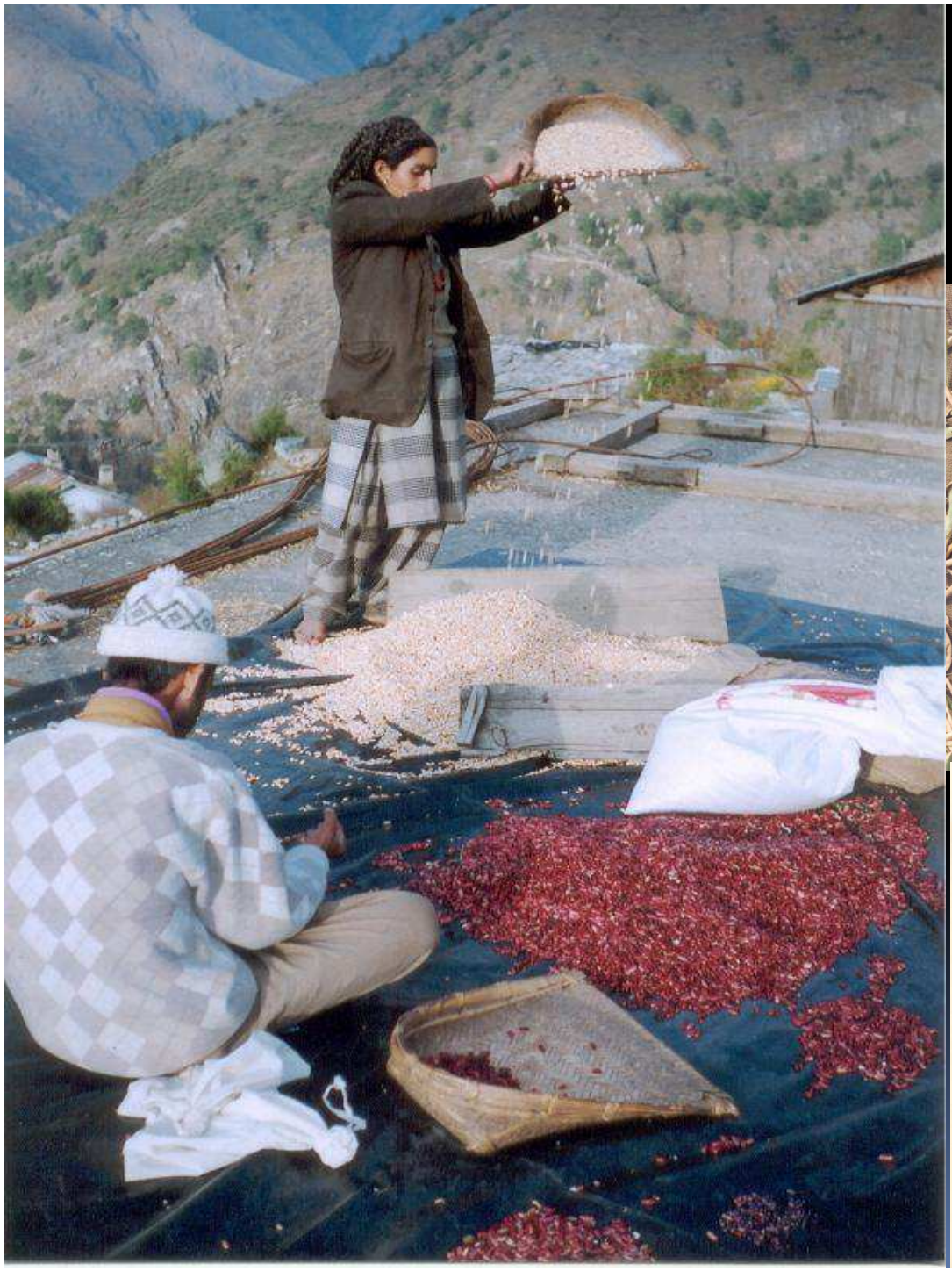
Kidney Beans
Rajma







Kidney beans



SOME CONSERVED RAJMA VARIETIES

ECONOMIC ANALYSIS OF GROWING HYBRID CORN COMPARED TO FINGER MILLET (RAGI) AND AMARANTH (RAMDANA)

HYBRID CORN

TYPE OF INPUT	AMOUNT OF INPUT PER HECTARE	NOMINAL COST (2003-04) IN INR	REAL COST (ADJUSTED FOR INFLATION TILL 2013) IN INR
LABOR	11.4 HOUR	200	455.66
MACHINERY	55 KG	4815.78	10971.74
DIESEL	88 L	1621.90	3695.16
GASOLINE	40 L	970.53	2211.15
NITROGEN	153 KG	4426.17	10084.10
PHOSPHOROUS	65 KG	1880.40	4284.10
POTASSIUM	77 KG	1113.77	2537.49
LIME	1120 KG	513.26	1169.36
SEEDS	21 KG	3490.64	7952.69
IRRIGATION	8.1 CM	5739.18	13075.52
HERBICIDES	6.2 KG	5785.84	13181.82
INSECTICIDES	2.8 KG	2612.96	5953.08
ELECTRICITY	13.2 KWH	42.93	97.81
TOTAL	-	33213.36	75669.67

HYBRID CORN

YIELD OF CORN	8655 KG/HA
MARKET PRICE OF YIELD IN 2013 INR	106329.27
NET PROFIT IN 2013 INR	30659.60

FINGER MILLET (RAGI)

RAJESHWARI VILL: MANIGUHA, RUDRAPRAYAG SIZE: 1NALI (=200 sq m)	Quantity	Total (Rs.)
Costs for field preparation*		
Ploughing Cattle	2	200*
Seeds	1kg	25*
Irrigation	nil	--
Chemical Fertilizers	nil	--
Other Fertilizers (FYM etc.)	nil	--
Pesticides and weedicides	nil	--
Weeding	1 or 2 man day)	400*
Harvesting of Heads and Straw	2 man day	400*
Threshing, winnowing etc.	3 man days	600*
Total cost in Production		**1625**
Transportation and labour Cost		100*
Other costs (if any?)	Gunny bags (04)	100
Total Expenditure per Farm		**Rs 1825**

FINGER MILLET (RAGI)

Total Expenditure per Hectare		Rs 91250
Total Production		
Grains	48kg @ Rs 16	768
Straw	400kg@Rs 2	800
Other (weeds)	200 kg x 2	400
Bhat	6 x 60	360
Kali Dal	6 x 85	510
Chaulai,	10x 75	750
Bhangjeera (Perilla)	2x 100	200
Other Straw	300 x 2	600
Gross Income per Farm		**Rs 4388**
Net Income per Farm (Gross income- Total expenditure)	**4388-1825**	**Rs 2563**
Gross Income per Hectare		**Rs 219400**
Net Income per Hectare		**Rs 128150**

Ragi: Finger Millet

AMARANTH (RAMDANA)

SUSHEELA DEVI VILL:KHARSI, CHAKRATA SIZE: 4 NALI (=800 sq m)	Quantity	Total (Rs.)
Costs for field preparation		
Ploughing Cattle	2	800*
Seeds	2kg	100*
Irrigation	nil	
Chemical Fertilizers	nil	
Other Fertilizers (FYM etc.)	40qtl	4000*
Pesticides and weedicides	nil	Nil
Weeding	4 man days	800*
Harvesting	2 man day	400*
Threshing, winnowing etc.	4 man days	800*
Total cost in Production		**6900**
Transportation and labour Cost		400*
Other costs (if any?)	Gunny bags (10)	250
Total Expenditure per Farm		**Rs 7550**

AMARANTH (RAMDANA)

Total Expenditure per Hectare		**Rs 94375**
Total Production		
Grains	400kg @ Rs 75	30000
Straw	500kg@Rs 2	1000
Other (weeds)	600 kg x 2	400
Kali Rajma	70 x 75	5250
Other Straw	130 x 2	260
Gross Income per Farm		**Rs 36910**
Net Income per Farm (Gross income- Total expenditure)	36910-7660	**Rs 29360**
Gross Income per Hectare		**Rs 461375**
Net Income per Hectare	22340 x 12.5	**Rs 367000**

Amaranth

Amaranth

Amaranth

ECONOMIC ANALYSIS OF GROWING GREEN PEAS COMPARED TO NATIVE ORGANIC DRIED VEGETABLES (SUKHDA/ SUKHSA)

GREEN PEAS

TYPE OF INPUT PER HECTARE	NOMINAL COST (2002-03) IN INR	REAL COST (ADJUSTED FOR INFLATION TILL 2013) IN INR
SEEDS	3538.90	8320.65
UREA	833.99	1960.88
SSP	37.02	87.04
DAP	1227.18	2885.35
ZINC	47.76	112.29
OTHER MICRONUTRIENTS	68.66	161.43
FARMYARD MANURE	170.74	401.44
PLANT PROTECTION CHEMICALS	453.45	1066.15
ELECTRICITY/DIESEL	630.99	1483.58
HUMAN LABOR	8284.93	19479.53
ANIMAL LABOR	190.80	448.61
MACHINERY/TRACTOR	1902.80	4473.86
TOTAL	17387.22	40880.83

GREEN PEAS

YIELD PER HA OF GREEN PEAS	7369 KG
NOMINAL GROSS REVENUE (2002-03) PER HA IN INR	57671
REAL GROSS REVENUE (ADJUSTED FOR INFLATION TILL 2013) IN INR	135596.06
NET PROFIT IN 2013 INR	94715.23

SUKHDA/SUKHSA

SARASWATI MAHILA ANNA SWARAJ GROUP VILL: KAMRI, UA SIZE: 1 NALI(=200 sq m)	Quantity	Total (Rs.)
Costs for field preparation		
Ploughing Cattle	2	800*
Seeds	200gm	200*
Irrigation	Rainfed	
Chemical Fertilizers	nil	
Other Fertilizers (FYM etc.)	4qtl	600*
Pesticides and weedicides	nil	Nil
Weeding	3 man days	600*
Harvesting	5 man day	1000*
Drying	4 man days	800*
Total cost in Production		**4000**
Transportation and labour Cost		200*
Other costs (if any?)	Nil	Nil
Total Expenditure per Farm		**Rs 4200**

SUKHDA/SUKHSA (DRIED VEGETABLES)

Total Expenditure per Hectare		**Rs 210000**
Total Production		
Vegetables (Karela - 30, Meetha Karela - 460, Lauki-60, Kaddu - 80, Mooli-20)	650kg @ Rs 15/kg fresh Dry wt. (80kg @160 /kg)	9600
Straw	500kg@Rs 2	1000
Other (weeds)	600 kg x 2	400
Gross Income per Farm		**Rs 11000**
Net Income per Farm	**11000- 4200**	**Rs 6800**
Gross Income per Hectare		**Rs 550000**
Net Income per Hectare	**6800 x 50**	**Rs 340000**

SUKHDA/SUKHSA ALONG WITH WILD VEGETABLE COLLECTION

Additional income through collection of wild Fern used as vegetable (Lingda) during summer season (June-August)	**1200 /bundles Approx 500 kg (fresh weight) 1 bundle (400 - 500gm) Dry wt (240 kg)**	**31250**
Expenditure on drying	10 Man days	2000
Gross income from Wild collection	**31250 -2000**	**29250**
Total income from 1 Nali farm and Wild collection		**36050**
Total Income from 1 Hectare farm and Wild Collection	**340000+29250**	**Rs 369250**

Green leafy vegetables – Wild and cultivated

Amaranths, Pig weeds, Spinach etc.

Wild greens and mushrooms

Bitter Gourd

Bottle gourd

Greens being dried in Solar Drier

Navdanya's Seed banks in Vilage Ladakh

Farmers Training in Bhutan

Seed Bank in Women's Alliance Office Leh

THANKYOU!