

# Chhatisgarh

**Prepared by:** Dr.M.C. Bhambri, S. K. Agrawal, Anup Singh, Ashok Pal, P.C. Kanwar, P.L. Sahu and S. Navrang, Indira Gandhi Krishi Vishwavidyalaya, Raipur (Chhatisgarh)

## Suggested cropping systems for organic production (based on testing under NPOF)

1. Soybean- Chickpea cropping system
2. Soybean-Onion cropping system
3. Rice-Chickpea cropping system

## Details of Cropping Systems

### 1: Cropping System: Soybean- Chickpea cropping system

Particulars	<i>Kharif</i>	<i>Rabi</i>
Crop	Soybean	Chickpea
Fortnight of sowing/planting	Second fortnight of June	Second fortnight of October to first fortnight of November
Fortnight of harvesting	Second fortnight of October	Second fortnight of February to first fortnight of March
Varieties suitable for organic farming	JS-335	Vaibhav

### Crop (*kharif*) : Soybean

#### Important features of suitable varieties

Parameters	JS-335
Duration (days)	95-100
Average yield under organic condition (kg/ha)	1500-1800
Source (s) of availability	NSP – IGKV, Raipur
Suitable regions/districts in the state	Kabirdham, Durg, Rajnandgaon, Bemetra, Raipur and parts of Bilaspur districts.
Specific resistance / tolerance to pest	Tolerance to stem fly
Specific resistance / tolerance to disease	Resistance to bacterial pustule and tolerance to bud blight

**Field preparation:** One deep ploughing followed by two harrowing and planking.

### Cultural practices

Seed rate (kg/ha) (Not applicable for nursery crops)	70-75		
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	<i>Rhizobium</i> culture	500 g/ha	Seed treatment

	PSB	500 g/ha	Seed treatment
	<i>Tricoderma viridi</i> culture	500 g/ha	Seed treatment
Spacing (Row X plant) in cm	30 X 10		
Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc	Source	Quantity/ha	
	FYM	2 t/ha	
	Vermicompost	0.8 t/ha	
	Neemcack	0.2 t/ha	
	Rock phosphate	0.27 t/ha	
Major weeds	Motha ( <i>Cyperus spp.</i> ), Crab grass ( <i>Digitaria sanguinalis</i> ), Jangali kodo – Goose grass ( <i>Eleusine indica</i> ), Sava – Barnyard grass ( <i>Echinochloa colona</i> ), Badi dudhi – Garden spurge ( <i>Euphorbia hirta</i> ), Dudhi – Milkweed ( <i>Euphorbia geniculata</i> ), Hazardana – Seed-under-leaf ( <i>Phyllanthus niruri</i> )		
Weed management	Critical stage of weeding	Recommended practice for organic condition	
	20-25 DAS	Hand weeding and mechanical weeding by cycle wheel hoe	
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	Tobacco caterpillar	<i>Baveriya basiyana</i> SLNPV 500 L.E.	4 gm/litre of water 2 ml/litre of water

### Yield and Economics

Parameters	2004	2005	2006	2007	2008	2009	2010	2011	2012
Economic yield (kg/ha)	1603	2385	2793	2448	1623	1556	1695	1081	1718
Price* (Rs/kg) (consider 25 % premium on prevailing market price)	Rs 27.50								
Cost of cultivation*(Rs/ha)	Rs. 22585								
Net returns* (Rs/ha)	Rs. 24651								

\*based on prices of 2013-14

### Crop (*Rabi*):Chickpea

Important features of suitable varieties

Parameters	Vaibhav
Duration (days)	110-115
Average yield under organic condition (kg/ha)	800-1000
Source (s) of availability	IGKV, Mega seed Project

Suitable regions/districts in the state	Chhattisgarh plains
Specific resistance / tolerance to disease	Wilt resistance

**Field preparation:** Ploughing through cultivator twice and planking

### Cultural practices

Seed rate (kg/ha)	70-80		
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	<i>Rhizobium</i> PSB	0.5 kg 0.5 kg	Seed treatment Seed treatment
Spacing (Row X plant) in cm	30 X 10		
Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc	Source	Quantity/ha	
	FYM	1.33 t/ha	
	Vermicompost	0.53 t/ha	
	Neemcack	0.13 t/ha	
Irrigation practices	Number of irrigations	Most critical stages for irrigation	Depth of irrigation (cm)
	2	Flowering and pod filling.	2-3
Major weeds	Bathua - Lambsquarters ( <i>Chenopodium album</i> ), Safed senji - White sweet clover ( <i>Melilotus alba</i> ), Krishna neel - Scarlet pimpernel ( <i>Anagallis arvensis</i> ), Chinouri - Medick ( <i>Medicago denticulate</i> ), Sava - Barnyard grass ( <i>Echinochloa colona</i> ), Motha ( <i>Cyperus spp.</i> )		
Weed management	Critical stage of weeding	Recommended practice for organic condition	
	25-30 DAS	Hand weeding or hand hoe/cycle hoe	
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	Gram pod borer	HaNPV	250 LE/ha 3 spray at weekly interval.
		<i>Trichogramma spp.</i>	50000 eggs/ha
		Pheromone trap	5-8 nos.



### Yield and Economics



Parameters	2004-05*	2005-06	2006-07	2007-08	2008-09
Economic yield (kg/ha)	770	1480	1090	610	957
Price (Rs/kg) (consider 25 % premium on prevailing market price)	25.00				
Cost of cultivation**(Rs/ha)	10091				
Net returns** (Rs/ha)	13828				

\*based on prices of 2013-14

## Glimpses

		
Neem cake	Vermicopost	F.Y.M.

<i>Kharif</i>	<i>Rabi</i>
	
Organic Soybean growth stage	Organic Chickpea pod setting stage

<i>Kharif</i>	<i>Rabi</i>
	
Organic soybean before harvesting	Organic Chickpea

## 2. Cropping System: Soybean- Onion cropping system

Particulars	<i>Kharif</i>	<i>Rabi</i>
Crop	Soybean	Onion
Fortnight of sowing/planting	Second fortnight of June	First fortnight of December
Fortnight of harvesting	Second fortnight of October	First fortnight of April
Varieties suitable for organic farming	JS-335	Nasik red

### Crop (*Kharif*): Soybean

Important features of suitable varieties

Parameters	JS-335
Duration (days)	95-100
Average yield under organic condition (kg/ha)	1500-1800
Source (s) of availability	NSP – IGKV, Raipur
Suitable regions/districts in the state	Kabirdham, Durg, Rajnandgaon, Bemetra, Raipur and parts of Bilaspur districts.
Specific resistance / tolerance to pest	Tolerance to Stem fly
Specific resistance / tolerance to disease	Resistance to bacterial pustule and tolerance to bud blight

**Field preparation:** One deep ploughings followed by two harrowing and planking.

### Cultural practices

Seed rate (kg/ha) (Not applicable for nursery crops)	70-75		
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	<i>Rhizobium</i> culture	500 g/ha	Seed treatment
	PSB	500 g/ha	Seed treatment
	<i>Tricoderma viridi</i> culture	500 g/ha	Seed treatment
Spacing (Row X plant) in cm	30 X 10		
Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc	Source	Quantity/ha	
	FYM	2 t/ha	
	Vermicompost	0.8 t/ha	
	Neem cake	0.2 t/ha	
	Rock phosphate	0.27 t/ha	
Major weeds	Motha ( <i>Cyperus spp.</i> ), Crab grass ( <i>Digitaria sanguinalis</i> ), Jangali kodo – Goose grass ( <i>Eleusine indica</i> ), Sava – Barnyard grass ( <i>Echinochloa colona</i> ), Badi dudhi – Garden spurge ( <i>Euphorbia hirta</i> ), Dudhi –		

	Milkweed ( <i>Euphorbia geniculata</i> ), Hazardana – Seed-under-leaf ( <i>Phyllanthus niruri</i> )		
Weed management	Critical stage of weeding	Recommended practice for organic condition	
	20-25 DAS	Hand weeding and mechanical weeding by cycle wheel hoe	
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	Tobacco caterpillar	<i>Baveriya basiyana</i> SLNPV 500 L.E.	4 gm/litre of water 2 ml/litre of water

### Yield and Economics

Parameters	2004*	2005	2006	2007	2008	2009	2010	2011	2012
Economic yield (kg/ha)	1603	2385	2793	2448	1623	1556	1695	1081	1718
Price** (Rs/kg) (consider 25 % premium on prevailing market price)	Rs 27.50								
Cost of cultivation*(Rs/ha)	Rs. 22585								
Net returns* (Rs/ha)	Rs. 24651								

\*based on prices of 2013-14

### Crop (*Rabi*) :Onion

Important features of suitable varieties

Parameters	Nasik Red
Duration (days)	100-110
Average yield under organic condition (kg/ha)	8000-12000
Source (s) of availability	Raipur Local Market
Suitable regions/districts in the state	Chhattisgarh plains

### Nursery raising practices (if applicable)

Area of nursery required for 1 ha	500 m <sup>2</sup>
Nursery raising method	raised bed method
Bed size (length X breadth in m)	5 X 1

Seed sowing rate/m <sup>2</sup>	20 g		
Source and optimum quantity of organic manures/other nutrient source/m <sup>2</sup> of nursery	Materials	Quantity/ m <sup>2</sup> area	Method of application
	Vermicompost	200 g	Soil incorporation
	FYM	500 g	Soil incorporation
Irrigation practices	First come up Irrigation after sowing and next 7-10 days interval		
Weed management	One hand weeding 25-30 days after sowing		
Optimum age of nursery (days)	40-45		

**Field preparation:** One deep ploughing followed by two harrowing and planking applied for field preparation.

### Cultural practices

Spacing (Row X plant) in cm	15 X 10		
Number of seedlings/hill (in nursery crops only)	1		
Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc	Source	Quantity/ha	
	FYM	5 t/ha	
	Vermicompost	2 t/ha	
	Neem cake	0.5 t/ha	
	Rock phosphate	0.27 t/ha	
Irrigation practices	Number of irrigations	Most critical stages for irrigation	Depth of irrigation (cm)
	6-8	Formation of bulb	3 - 4
Major weeds	Amarbel – Dodder ( <i>Cuscuta spp</i> ), Bathua - Lambsquarters ( <i>Chenopodium album</i> ), Choulai – Green amaranth ( <i>Amaranthus viridis</i> ), Safed senji – White sweet clover ( <i>Melilotus alba</i> ), Sava – Barnyard grass ( <i>Echinochloa colona</i> ), Motha - ( <i>Cyperus spp.</i> ) and Chanori – Medick ( <i>Medicago denticulate</i> )		
Weed management	Critical stage of weeding	Recommended practice for organic condition	
	20-25 and 45-50 DAS	Hand weeding and interculture	
Optimum stage of harvesting	100-110 days		

### Yield and Economics



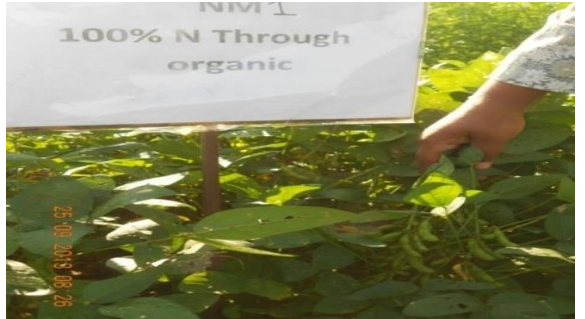

Parameters	2009-10*	2010-11	2011-12	2012-13
Economic yield (kg/ha)	9070	11800	13260	13170
Price (Rs/kg) (consider 25 % premium on prevailing market price)	Rs. 12.50			

Cost of cultivation*(Rs/ha)	Rs. 37686
Net returns* (Rs/ha)	Rs.126902

\*based on prices of 2013-14

## Glimpses



<i>Kharif</i>	<i>Rabi</i>
	
Organic Soybean growth stage	Organic Onion growth stage
<i>Kharif</i>	<i>Rabi</i>
	
Organic soybean before harvesting	Organic Onion produce



### 3. Cropping System: Rice-Chickpea cropping system

Particulars	<i>Kharif</i>	<i>Rabi</i>
Crop	Rice	Chickpea
Fortnight of sowing/planting	Second fortnight of June	Second fortnight of November
Fortnight of harvesting	First fortnight of November	First fortnight of March
Varieties suitable for organic farming	Kasturi and Sugundhmati	Vaibhav

#### Crop (*kharif*):Rice

Important features of suitable varieties

Parameters	Kasturi	Sugandhmati
Duration (days)	120-130	135-140
Average yield under organic condition (kg/ha)	3500-4000	3500-4000
Source (s) of availability	NSP, IGKV, Raipur	NSP, IGKV, Raipur
Suitable regions/districts in the state	Chhattisgarh Plain zone	Chhattisgarh Plain zone
Specific resistance / tolerance to pest	Stem borer tolerance	
Specific resistance / tolerance to disease	Blast resistance	

#### Nursery raising practices.

Area of nursery required for 1 ha	1000 m <sup>2</sup>		
Nursery raising method	Raised bed method		
Bed size (length X breadth in m)	10 X 1		
Seed sowing rate/m <sup>2</sup>	40 g		
Source and optimum quantity of organic manures/other nutrient source/m <sup>2</sup> of nursery	Materials	Quantity/ m <sup>2</sup> area	Method of application
	Enriched compost	100 g	Soil application
	Cow dung manure	500 g	Soil application
	N.E.O.C. – Non edible oil cake	50 g	Soil application
Irrigation practices	First come up irrigation after sowing and next 6-7 days interval		
Optimum age of nursery (days)	21-25 days		

**Field preparation:** Sowing of Sunhemp should be done during May month for green manuring purpose and incorporated in the field at vegetative stage around 40-45 DAS. For incorporation of the green manure impound the water in the field and after that plough the field twice and use rotavator once for proper incorporation and puddling.

### Cultural practices

Spacing (Row X plant) in cm	20 X 10		
Number of seedlings/hill (in nursery crops only)	2-3		
Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc	Source	Quantity/ha	
	Enriched compost	6.6 t	
	Cow dung manure	4.4 t	
	N.E.O.C. – Non edible oil cake	0.88 t	
Top dressing of organic manures	Rock phosphate	0.05 t	
	Source	Quantity/ha	Days after sowing/planting or stage of crop
	Biodynamic preparation	2.5 g/32.5 lit water	P.I. and flowering stage
	Panchagavya	50 litre	P.I. and flowering stage
Irrigation practices	Number of irrigations	Most critical stages for irrigation	Depth of irrigation (cm)
	5-6	Tillerig & grain filling	5-7
Major weeds	Sava – Barnyard grass ( <i>Echinochloa colona</i> , <i>Echinochloa crus-galli</i> ) Motha ( <i>Cyperus spp.</i> ), Kauva keni – Benghal day flower ( <i>Commelina benghalensis</i> ), Resham Kanta – Sessil joyweed ( <i>Alternanthera sessilis</i> ), Kana – Creeping cradle plant ( <i>Cynotis axillaris</i> ) etc.		
Weed management	Critical stage of weeding	Recommended practice for organic condition	
	20 DAT and 10-15 days interval thereafter.	Ambika Paddy weeder	
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)
	leaf folder	Neem oil	2 litres

### Yield and Economics

Parameters	2009-10*	2010-11	2011-12	2012-13
Economic yield (kg/ha)	3550	4280	4260	4320
Price (Rs/kg) (consider 25 % premium on prevailing market price)	16			
Cost of cultivation*(Rs/ha)	31900			
Net returns*(Rs/ha)	43362			

\*based on prices of 2013-14

## Crop (*Rabi*) : Chickpea

Important features of suitable varieties

Parameters	Vaibhav
Duration (days)	110-115
Average yield under organic condition (kg/ha)	800-1000
Source (s) of availability	IGKV, Mega seed Project
Suitable regions/districts in the state	Chhattisgarh plains
Specific resistance / tolerance to disease	Wilt resistance

**Field preparation:** Ploughing through cultivator twice and planking

### Cultural practices

Seed rate (kg/ha)	70-80		
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit/ha)	Method of application
	<i>Rhizobium</i>	0.5	Seed treatment
	PSB	0.5	Seed treatment
Spacing (Row X plant) in cm	30 X 10		
Basal application of organic manures including soil application of bio-fertilizers, bio-control agents etc	Source	Quantity/ha	
	Enriched compost	1.66 t	
	Cow dung manure	1.11 t	
	N.E.O.C. – Non edible oil cake	0.22 t	
	Rock phosphate	0.17 t	
Top dressing of organic manures	Source	Quantity/ha	Days after sowing/planting or stage of crop
	Biodynamic preparation	2.5 g/32.5 litre water	2 spray at flowering stage in 15 days interval
	Panchagavya	50 litre	3 spray at flowering stage in 10 days interval
Irrigation practices	Number of irrigations	Most critical stages for irrigation	Depth of irrigation (cm)
	2	flowering	2-3
Major weeds	Bathua - Lambsquarters ( <i>Chenopodium album</i> ), Safed senji -White sweet clover ( <i>Melilotus alba</i> ), Krishna neel - Scarlet pimpernel ( <i>Anagallis arvensis</i> ), Chinouri - Medick ( <i>Medicago denticulate</i> ), Sava - Barnyard grass ( <i>Echinochloa colona</i> ), Motha ( <i>Cyperus spp.</i> )		
Weed management	Critical stage of weeding	Recommended practice for organic condition	
	25-30 DAS	Hand weeding or hand hoe/cycle hoe	
Organic plant protection practices	Name of pest/disease	Organic material recommended for control	Quantity (kg or litres/ ha)







	Gram pod borer	HaNPV	250 LE/ha 3 spray at weekly interval.
		<i>Trichogramma spp.</i>	50000 eggs/ha
		Pheromone trap	5-8 nos.

### Yield and Economics

Parameters	2009-10*	2010-11	2011-12	2012-13
Economic yield (kg/ha)	1008	1210	1370	1270
Price (Rs/kg) (consider 25 % premium on prevailing market price)	32			
Cost of cultivation*(Rs/ha)	21622			
Net returns* (Rs/ha)	19045			

\*based on prices of 2013-14

### Glimpses

	
Cow dung manure <i>Kharif</i>	Neem cake <i>Rabi</i>
	
Organic rice field of NPOF experiment during 2012-13 <i>Kharif</i>	Panchgavaya spray at chickpea of NPOF experiment during 2012-13 <i>Rabi</i>
	
Organic Paddy	Organic Chickpea mature stage