Maharashtra

Package of practices for Organic Crop Production

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Suggested cropping systems (based on testing under NPOF)

- 1. Rice-Groundnut
- 2. Rice-Dolichos bean
- 3. Rice-Cucumber
- 4. Rice-Red pumpkin

Details of Cropping Systems: 1: Rice – Groundnut

Particulars	Kharif	Rabi
Crop	Rice	Groundnut
Fortnight of sowing/planting	Nursery Sowing -Second	Sowing - Second fortnight
	fortnight of June	of December
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	Second fortnight of April
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	SB-XI, Konkan Guarav and
organic farming	Palghar-1	Konkan Trombay Tapora

Crop (Kharif): Rice

Important features of suitable varieties

Parameters	Karjat-3	Karjat-4	Karjat-7	Palghar-1
Duration (days)	115-120	110-115	115-120	125-130
Average yield under organic condition (kg/ha)	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
Source (s) of availability	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
Suitable regions/districts in the state	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in <i>Konkan</i> region of Maharashtra.	Suitable for rainfed uplands and irrigated transplanted conditions in Maharashtra State.	Konkan region and Maharashtra state
Specific	Tolerant to stem	Moderately	Resistant to leaf	Moderately
resistance/tolerance	borer	resistant to	folder,	resistant to

to pest		leaf folder	BPH,WBPH	stem borer
			and moderately	
			resistant to stem	
			borer	
Specific	Resistant to blast		Moderately	Moderately
resistance/tolerance	and moderately		resistant to blast	resistant to
to disease	resistant to BLB		and BLB	blast
	and brown spots.			
Specific tolerance to	Suitable for high	Suitable for	Suitable for	Suitable for
drought/water	rainfall zone	high rainfall	high rainfall	high rainfall
logging		zone	zone	zone

	1				
Area of nursery required for	0.10 ha (1000m ²	(1)			
1 ha					
Nursery raising method	Wet nurse	ry /Mat nursery/Ra	ised bed method etc.		
Bed size (length x breadth	Length as per slope of the land (sloppy land less length, plane				
in m)	land more length) - Breadth- 1 m				
Seed sowing rate/m ²	$45 \text{ to } 50 \text{ g/m}^2$				
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of application		
treatment		seed or per m ²			
		area			
	Trichoderma	5g/kg of seed	Seed treatment		
Source and optimum	Materials	Quantity/m ² area	Method of application		
quantity of organic					
manures/other nutrient	FYM	3 kg/m ² area	Soil incorporation		
source/m ² of nursery			before nursery sowing		
Irrigation practices	Rainfed		,		
Weed management	Mulching of <i>Gly</i>	ricidia green leaves	and mannual hand		
	weeding	C			
Organic plant protection	Name of	Recommended	Quantity/m ² area		
practices	pest/disease	organic material			
	-	used for control			
	Different	Application of	1500 ppm@5 ml/lit of		
	insect pests	neem formulation	water for two times		
Optimum age of nursery	22 to 26 days	<u>'</u>	<u>'</u>		
(days)					
T7' 1 1					

Field preparation:

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling.

The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit./ha) PSB 2.5 kg +		Method of application
	Phosphate	PSB 2.5 k	(g +	Seedling root dip for
	solubilizing	Azospirill		20 to 30 minutes in
	bacteria (PSB)	kg + 100	lit of	the slurry
	and <i>Azospirillum</i>	water/ha		
Spacing (Row x Plant) in cm			x15cm	
Number of seedlings/hill			edlings/h	
Basal application of organic	Source	!		Quantity/ha
manures including soil application of bio-fertilizers,	FYM	5000 kg /ha before puddling		
bio-control agents etc.	Neem cake		500 kg	/ha before puddling
	Glyricidia Green	leaves		g /ha soil incorporation ransplanting
	Rice straw			g /ha soil incorporation ransplanting
Top dressing of organic	Source	Quanti		Days after
manures			,	sowing/planting or stage of crop
1.	Cow urine	50 lit/ha		Spraying at 30 and 60
2.	Vermiwash	50 lit/ha		days after transplanting
Irrigation practices	Rainfed during <i>K</i>	harif and ca	anal irriga	ation during <i>Rabi</i>
Major weeds	Echinochloa crus	<i>galli</i> (Phak	had), Ec	hinochloa colonum
	(Phakhad), Cype	rus iria (La	ıvala), <i>C</i> y	perus rotundus (Lavala)
	and Ischane globe	ossa (Dhur))	
Weed management	Critical stage of	weeding		commended practice
	20.5			organic condition
	20 Days after tran			no- weeder hoeing
	30 Days after tra	nsplanting		no- weeder hoeing and
	(Tillering)			nual hand weeding
	60 Days after tra		Ma	nual hand weeding
	(Panicle initiation	ı)		

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control
Insect pests	Stem borer	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i>

	Case worm	 bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field
	Case worm	 Timely transplanting Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration
	Army worm	 Deep ploughing after harvesting of crop to expose the hibernating stages of pest. Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field. Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field.
	Leaf eating caterpillars	Erection of bird perches.
Diseases	Blast and sheath rot	 Use of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers.

Adoption of proper spacing (20x15cm)	
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Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	201	3-14
Economic							Grain	Straw
yield	1960	2873	3150	3543	3411	3842	3418	4032
(kg/ha)							3410	4032
Price (Rs/kg	g)							
consider 259	%			Croin.	Da 16 00/lz	~		
Premium on			Grain: Rs.16.88/kg					
prevailing m	narket		Straw: Rs. 2.50/kg					
price								
Cost of culti	vation				2227			
(Rs/ha)		82327						
Net Returns	(Rs/ha)			-	14577			

^{*}based on prices of 2013-14

Crop (Rabi): **Groundnut**

Important features of suitable varieties: SB XI, Konkan Guarav and Konkan Trombay Tapora

Parameters	SB-XI	Konkan Guarav	Konkan Trombay Tapora
Duration (days)	110-115	120-125	120-125
Average yield under	1200 to 1500	1800 to 2000	1900 to 2100
organic condition			
(kg/ha)			
Source (s) of	RARS, Karjat	RARS, Karjat	RARS, Karjat
availability	-		-
Suitable	Maharashtra	Konkan region	Konkan region of
regions/districts in the	state	of Maharashtra	Maharashtra
state			
Specific	Tolerant to	Tolerant to tikka	Tolerant to <i>tikka</i> (leaf spot)
resistance/tolerance to	tikka (leaf spot)	(leaf spot) and	and rust
disease	and rust	rust	

Field preparation:

Plough the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Seed rate (kg/ha)	SB XI- 95 kg kernels/ha, Konkan Guarav- 110 kg					
	kernels /ha, Ko i	kernels /ha, Konkan Trombay Tapora - 125 kg				
	kernels/ha					
Pre-sowing/planting treatment of	Material	Recommended	Method of			
seed/seedlings		rate (kg/ha or	application			
_		lit./ha)				
	Trichoderma	5g/kg of seed	Seed treatment			

	Rhizobium strain	25g/ kg of s	seed	Seed treatment	
	PSB	25g/ kg of s	seed	Seed treatment	
Spacing (Row x Plant) in cm		30x15cm			
Basal application of organic	Sour	cce Quantity/ha		Quantity/ha	
manures including soil application	FYN	M		1500 kg/ha	
of bio-fertilizers, bio-control agents	Neem	cake		160 kg/ha	
etc.	Vermico	mpost		560 kg/ha	
Top dressing of organic manures	Source	Quantit	y/ha	Days after	
				sowing/planting	
				or stage of crop	
1.	Cow urine	50 lit/	ha	Spraying at 30	
2.	Vermiwash	50 lit/	ha	and 60 days	
				after sowing	
Irrigation practices	Number of	Most critical		Depth of	
	_ , ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	stage of irrigation		1	
S F	irrigation			irrigation (cm)	
S F				_	
S F	irrigation	stage of irr		irrigation (cm)	
S F	irrigation 10 irrigations	stage of irr Branching, Flowering, Pegging, Po	rigation	irrigation (cm) 60 cm	
S F	irrigation 10 irrigations at an interval	stage of irr Branching, Flowering,	rigation	irrigation (cm) 60 cm (6 cm/	
S F	irrigation 10 irrigations at an interval	stage of irr Branching, Flowering, Pegging, Po	rigation	irrigation (cm) 60 cm (6 cm/	
Major weeds	irrigation 10 irrigations at an interval	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling	rigation od nd	60 cm (6 cm/ irrigation)	
	irrigation 10 irrigations at an interval of 10-12 days	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopati	od nd), <i>Portula</i>	60 cm (6 cm/ irrigation)	
	irrigation 10 irrigations at an interval of 10-12 days	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopatialternanthera	od nd), Portula sessilis (irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata),	
	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math)	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar	od nd), Portula sessilis (irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata),	
	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar	od nd), Portula sessilis (nd Amara	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), anthus viridis nended practice	
Major weeds	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math) Critical stage of	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar of weeding	od and), Portula sessilis (and Amara Recomm	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), anthus viridis mended practice mic condition	
Major weeds	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math)	stage of irr Branching, Flowering, Pegging, Poformation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar of weeding	od nd), Portula sessilis (nd Amara Recomn for orga	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), unthus viridis nended practice inic condition v land weeder	
Major weeds	irrigation 10 irrigations at an interval of 10-12 days Physalis minima (Motha ghol), A Blumea lacera ((Ranti math) Critical stage of	stage of irr Branching, Flowering, Pegging, Po formation a Pod filling a (Ranpopatialternanthera (Bhamrud) ar of weeding	od and od sessilis (and Amara Dry Manua	irrigation (cm) 60 cm (6 cm/ irrigation) aca oleracea (Reshimkata), anthus viridis mended practice mic condition	

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Aphids	Application of neemicide	3ml/lit
	Tikka (leaf spot)	Use of tolerant and resistant varieties.	
	Rust	• Use of tolerant and resistant varieties.	
		 Judicious use of irrigation. Timely	

			harvesting.	
Optimum stage of harvesting	•	General yello	wing of crop.	
	•	Blackening of	f inside portion of shell.	
	•	Development	of ridges on pod	
	•	Colour develo	opment of kernel as per	varietal
		character.		

Parameters	2007- 08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14
Economic yield (kg/ha)	1671	3395	3648	2881	2584	2546	1876
Price (Rs/kg) consider 25% Premium on prevailing market price		Rs.75/kg					
Cost of cultivation (Rs/ha)	74333						
Net Returns (Rs/ha)	66367						

^{*}based on prices of 2013-14

Rice-Groundnut cropping system economics:

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
208450	156660	51790	1.33

Cropping System 2: Rice-Dolichos bean

Details of Cropping Systems

Particulars	Kharif	Rabi
Crop	Rice	Dolichos bean
Fortnight of	Nursery Sowing -Second	Sowing - Second fortnight
sowing/planting	fortnight of June	of December
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	First fortnight of February to
		second fortnight of March
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	Konkan Bhushan
organic farming	Palghar-1	Konkan Dhushan

Crop (Kharif): Rice

Important features of suitable varieties

Parameters	Karjat-3	Karjat-4	Karjat-7	Palghar-1

Duration (days)	115-120	110-115	115-120	125-130
Average yield under organic condition (kg/ha)	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
Source (s) of availability	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
Suitable regions/districts in the state	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in <i>Konkan</i> region of Maharashtra.	Suitable for rainfed uplands and irrigated transplanted conditions in Maharashtra State.	Konkan region and Maharashtra state
Specific resistance/toleran ce to pest	Tolerant to stem borer	Moderately resistant to leaf folder	Resistant to leaf folder, BPH,WBPH and moderately resistant to stem borer	Moderately resistant to stem borer
Specific resistance/toleran ce to disease	Resistant to blast and moderately resistant to BLB and brown spots.		Moderately resistant to blast and BLB	Moderately resistant to blast
Specific tolerance to drought/water logging	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone

Area of nursery required	0.10 ha (1000n	n^2)	
for 1 ha			
Nursery raising method	Wet nurse	ery /Mat nursery/F	Raised bed method etc.
Bed size (length x breadth	Length as per s	lope of the land (slo	oppy land less length, plane
in m)	land more leng	th) - Breadth- 1 m	
Seed sowing rate/m ²	45 to 50 g/m ²		
Pre-sowing seed/soil	Materials	Quantity/kg of	Method of application
treatment		seed or per m ²	
		area	
	Trichoderma	5g/kg of seed	Seed treatment
Source and optimum quantity of organic	Materials	Quantity/m ² area	Method of application
manures/other nutrient source/m ² of nursery	FYM	3 kg/m ² area	Soil incorporation before nursery sowing

Irrigation practices	Rainfed			
Weed management	Mulching of <i>Glyricidia</i> green leaves and mannual hand weeding			
Organic plant protection practices	Name of pest/disease	Recommended organic material used for control	Quantity/m ² area	
	Different insect pests	Application of neem formulation	1500 ppm@5 ml/lit of water for two times	
Optimum age of nursery (days)	22 to 26 days			

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling.

The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material	rate (k	mended g/ha or 'ha)	Method of application	
	Phosphate solubilizing bacteria (PSB) and Azospirillum	PSB 2.5 k Azospirilli + 100 lit o	_	Seedling root dip for 20 to 30 minutes in the slurry	
Spacing (Row x Plant) in cm	20x15cm				
Number of seedlings/hill (in nursery crop only)	3-4 seedlings/hill				
Basal application of	Source	Source Qua			
organic manures including soil application	FYM		5000 kg /h	na before puddling	
of bio-fertilizers, bio-	Neem cake 500 kg /		500 kg/h	na before puddling	
control agents etc.	Glyricidia Green leaves		4500 kg /ha soil incorporation before transplanting		
	Rice straw		4200 kg before train	/ha soil incorporation	
Top dressing of organic manures	Source	Quan	tity/ha	Days after sowing/planting or stage of crop	

1.	Cow urine	50 lit/ha		Spraying at 30 and
				60 days after
2.	Vermiwash	50 lit/ha		transplanting
Irrigation practices	Rainfed during Khari	f and canal:	irrigation d	uring <i>Rabi</i>
Major weeds	Echinochloa crusgall	i (Phakhad)	, Echinoch	loa colonum
	(Phakhad), Cyperus i	<i>ria</i> (Lavala), Cyperus i	rotundus (Lavala)
	and Ischane globossa	(Dhur)		
Weed management	Critical stage of wee	ding	Recomme	ended practice for
			organic co	ondition
	20 Days after transpla	inting	Cono- wee	eder hoeing
	30 Days after transplanting Cono- wee		eder hoeing and	
	(Tillering) manual ha		nd weeding	
	60 Days after transpl	anting	Manual ha	and weeding
	(Panicle initiation)			

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control
Insect pests	Stem borer	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field
	Case worm	 Timely transplanting Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration

Army worm	 Deep ploughing after harvesting of crop to
	expose the hibernating stages of pest.

		 Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field. Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field.
	Leaf eating caterpillars	Erection of bird perches.
Diseases	Blast and sheath rot	 Use of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm)

Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	20	13-14	
Economic							Grai	Straw	
yield (kg/ha)	3148	2050	3940	2700	2780	3558	n	Suaw	
							3324	3921	
Price (Rs/kg) consider 25% Premium on prevailing market price		Casin, Do 16 00/lyo							
		Grain: Rs.16.88/kg Straw : Rs. 2.50/kg							
(Rs/ha)		02321							
Net Returns (Rs/ha) -16440									

^{*}based on prices of 2013-14

Crop (Rabi): Dolichos bean

Important features of suitable varieties: Konkan Bhushan

Parameters	Variety: Konkan Bhushan
Duration (days)	100 days
Average yield under organic condition (kg/ha)	5000-5200 green pods kg/ha
Source (s) of availability	RARS, Karjat

Suitable regions/districts in the state	Maharashtra state
Specific resistance/tolerance to disease	Resistant to yellow mosaic virus
Special character	Dwarf, Does not require support

Plough the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Seed rate (kg/ha)	25kg/ha					
Pre-sowing/planting treatment of	Material	Material Recommended		Method of		
seed/seedlings		rate (kg/ha or		application		
		lit./ha	/			
	Trichoderma	5g/kg of se	ed	Seed treatment		
	Rhizobium	25g/kg of so	eed	Seed treatment		
	strain					
	PSB	25g/kg of so	eed	Seed treatment		
Spacing (Row x Plant) in cm		45 x 15	cm			
Basal application of organic	Sour	ce		Quantity/ha		
manures including soil application	FYN	M		4000 kg/ha		
of bio-fertilizers, bio-control agents	Neem	cake		390 kg/ha		
etc.	Vermico	mpost		1330 kg/ha		
Top dressing of organic manures	Source	Quantity	/ha	Days after		
				sowing/planting		
				or stage of crop		
1.	Cow urine	50 lit/ł		Spraying at 30		
2.	Vermiwash	50 lit/h	ıa	and 60 days		
				after sowing		
Irrigation practices	Number of	Most crit		Depth of		
	irrigation	stage of irri		irrigation (cm)		
	9 irrigations	Branchi	_	54 cm		
		Flowering a		(6 cm/irrigation)		
		formati				
Major weeds	Physalis minime					
	(Motha ghol), Alternanthera sessilis (Reshimkata)			•		
	Blumea lacera (Bhamrud) and Amaranthus viridis					
	(Ranti math)					
Weed management	Critical stage of weeding Recommended pra-			_		
				nic condition		
	25-40 DAS		•	l weeder, One		
			hand we	eeding		

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Aphids	 Application of 	3ml/lit

		neemicide		
	Pod borer	 Application of 	3ml/lit	
		neemicide		
Diseases	Powdery	• Use of resistant and tolerant		
	mildew	varieties.		
Optimum stage of harvesting	Picking for green pods from 60 to 100 days after			
	sowing			

Yield and economics:

Parameters	2007- 08	2008- 09	2009-10	2010-11	2011- 12	2012-13	2013-14
Economic yield (kg/ha)	5024	2998	3017	1904	4949	5627	4974
Price (Rs/kg) consider 25% Premium on prevailing market price				Rs. 37.50	0/kg		
Cost of cultivation (Rs/ha)	131093						
Net Returns (Rs/ha)	55432						

^{*}based on prices of 2013-14

Rice-Dolichos bean cropping system economics :

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
252412	213420	38992	1.18

Cropping Systems: 3: Rice – Cucumber

Particulars	Kharif	Rabi
Crop	Rice	Cucumber
Fortnight of	Nursery Sowing -Second	Sowing – First fortnight of
sowing/planting	fortnight of June	January
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	First fortnight of March to
		first fortnight of April
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	Hamanai and Chastal
organic farming	Palghar-1	Hemangi and Sheetal

Crop (*Kharif*): **Rice** Important features of suitable varieties

Parameters Karjat-3	Karjat-4	Karjat-7	Palghar-1
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Duration (days)	115-120	110-115	115-120	125-130
Average yield under organic condition (kg/ha)	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
Source (s) of availability	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
Suitable regions/districts in the state	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	Suitable for rainfed uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in <i>Konkan</i> region of Maharashtra.	Suitable for rainfed uplands and irrigated transplanted conditions in Maharashtra State.	Konkan region and Maharashtra state
Specific resistance/tolerance to pest	Tolerant to stem borer	Moderately resistant to leaf folder	Resistant to leaf folder, BPH,WBPH and moderately resistant to stem borer	Moderately resistant to stem borer
Specific resistance/tolerance to disease	Resistant to blast and moderately resistant to BLB and brown spots.		Moderately resistant to blast and BLB	Moderately resistant to blast
Specific tolerance to drought/water logging	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone	Suitable for high rainfall zone

Area of nursery required for 1 ha	$0.10 \text{ ha} (1000\text{m}^2)$				
Nursery raising method	Wet nu	rsery /Mat nurser	y/Raised bed method etc.		
Bed size (length x breadth in m)			nd (sloppy land less length,		
	plane lan	d more length) - Br	eadth- 1 m		
Seed sowing rate/m ²	45 to 50	g/m ²			
Pre-sowing seed/soil treatment	Materi	Quantity/kg of	Method of application		
	als	seed or per m ²			
		area			
	Trichod erma	Seed treatment			
Source and optimum quantity of	Materi	Quantity/m ²	Method of application		
organic manures/other nutrient	als	area			
source/m ² of nursery	EVM	3 kg/m ² area	Soil incorporation before		
	FYM	3 kg/m area	nursery sowing		
Irrigation practices		Raiı	nfed		

Weed management	Mulching	Mulching of Glyricidia green leaves and mannual hand				
	weeding					
Organic plant protection practices	Name	Recommended				
	of	organic	Quantity/m ² area			
	pest/di material used		Quantity/iii area			
	sease for control					
	Differe	Application of	1500 ppm@5 ml/lit of			
	nt	neem	water for two times			
	insect	formulation				
	pests					
Optimum age of nursery (days)	22 to 26	days				

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling. The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material rate		mended g/ha or 'ha)	Method of application	
	Phosphate solubilizing bacteria (PSB)	PSB 2.5 k Azospirilli + 100 lit c	_	Seedling root dip for 20 to 30 minutes in the	
	and <i>Azospirillum</i>	100 110	water/na	slurry	
Spacing (Row x Plant) in cm		20x1	5cm		
Number of seedlings/hill		3-4 seed	lings/hill		
Basal application of	Source		Quantity/ha		
organic manures including soil application	FYM		6670 kg /ha before puddling		
of bio-fertilizers, bio-	Glyricidia Green leaves		1220 kg /ha before puddling		
control agents etc.	Rice straw		5470 kg /ha soil incorporation before transplanting		
Irrigation practices	Rainfed during Khari	f and canal	irrigation d	uring <i>Rabi</i>	
Major weeds	Echinochloa crusgall	i (Phakhad)	, Echinoch	loa colonum	
	(Phakhad), Cyperus i	<i>iria</i> (Lavala	.), Cyperus i	rotundus (Lavala)	
	and Ischane globossa (Dhur)				
Weed management	Critical stage of weeding			ended practice for	
			organic co		
	20 Days after transpla			eder hoeing	
	30 Days after transplanting				
	(Tillering)		manual ha	and weeding	

60 Days after transplanting (Panicle initiation)	Manual hand weeding
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Organic plant protection practices	Name of the pest/disease	Organic material recommended for control
Insect pests	Stem borer	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field
	Case worm	 Timely transplanting Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration
	Army worm	 Deep ploughing after harvesting of crop to expose the hibernating stages of pest. Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field.

	Leaf eating caterpillars	 Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field. Erection of bird perches.
	caterpinars	Use of tolerant and resistant varieties.
Diseases	Blast and sheath rot	 Ose of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm)

Parameters	2007-08	2008-09	2009-10	2010-11	2011- 12	2012-13	
Economic	2650	0.45	4175	2720	25.65	Grain	Straw
yield (kg/ha)	2650	945	4175	3728	3565	3414	4097
Price (Rs/kg 25% Premit prevailing m	ım on	Grain : Rs.15.63/kg Straw : Rs. 2 / kg					
Cost of culti (Rs/ha)	vation	42016					
Net Returns	(Rs/ha)		19539				

^{*}based on prices of 2013-14

Crop (Rabi): Cucumber

Important features of suitable varieties: Hemangi and Sheetal

	Variety			
Parameters	Hemangi	Sheetal		
Duration (days)	100-110	95-105		
Average yield under organic condition (kg/ha)	11500-12000	12000-12500		
Source (s) of availability	Government/private agencies	DBSKKV, Dapoli		
Suitable regions/districts in the state	Maharashtra state	Maharashtra state		
Specific resistance/tolerance to disease	Tolerant to powdery mildew and downy mildew			

Ploughing the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Seed rate (kg/ha)	2.75 kg/ha					
Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit./ha)		Method of application		
	Trichoderma	5g/kg of se	ed	Seed treatment		
	PSB	25g/kg of so	eed	Seed treatment		
Spacing (Row x Plant) in cm		1.5 x 0	.9 m			
Basal application of organic	Sour	rce	(Quantity/ha		
manures including soil application	FYN	M		9000 kg/ha		
of bio-fertilizers, bio-control agents	Neem	Neem cake		870 kg/ha		
etc.	Vermico	mpost		3000 kg/ha		
Irrigation practices	Number of	Most crit	tical	Depth of		
	irrigation	stage of irri	gation	irrigation (cm)		
	12 irrigations	12 irrigation		72 cm		
		interval o	f 7-8	(6 cm/irrigation)		
		days				
Major weeds	Physalis minim					
	(Motha ghol), A					
	Blumea lacera (Bhamrud) and Amaranthus viridis					
	(Ranti math)					
Weed management	Critical stage of weeding Recommended practice					
	for organic condition					
	30-60 DAS Hand w			eeding		

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)
Insect pests	Red pumpkin beetle	Application of neemicide.	3ml/lit
	Fruit fly	Erection of Rakshak pheromone trap designed by Dr. BSKKV, Dapoli	4 Nos. /ha
Diseases	Powdery and Downey mildew	 Growing tolerant and resistant varieties. Crop rotation.	
Optimum stage of harvesting (in case of vegetables and green cob)	• 60-100 DA	AS.	

Parameters	2007- 08	2008-09	2009-10	2010-11	2011-12	2012-13	
Economic yield (kg/ha)	6044	8507	5509	5919	11357	12537	
Price (Rs/kg) consider 25% Premium on prevailing market price	Rs.15/kg						
Cost of cultivation (Rs/ha)	86505						
Net Returns (Rs/ha)	101550						

^{*}based on prices of 2013-14

Rice-Cucumber cropping system economics:

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio
249610	128521	121089	1.94

Cropping Systems 4: Rice-Red pumpkin

Particulars	Kharif	Rabi
Crop	Rice	Red pumpkin
Fortnight of	Nursery Sowing -Second	Sowing – First fortnight of
sowing/planting	fortnight of June	January
	Transplanting- Second	
	fortnight of July	
Fortnight of harvesting	Second fortnight of October	First fortnight of April
Varieties suitable for	Karjat-3, Karjat-4, Karjat-7 and	MPH-1
organic farming	Palghar-1	

Crop (Kharif): Rice

Important features of suitable varieties

Parameters	Karjat-3	Karjat-4	Karjat-7	Palghar-1
Duration (days)	115-120	110-115	115-120	125-130
Average yield	3500 to 3700	3300 to 3500	3400 to 3600	3900 to 4100
under organic				
condition (kg/ha)				
Source (s) of	RARS, Karjat	RARS, Karjat	RARS, Karjat	RARS, Karjat
availability			_	
Suitable	Suitable for rainfed	Suitable for	Suitable for	Konkan region

regions/districts in the state	uplands as well as irrigated areas for <i>Kharif</i> and <i>Rabi</i> seasons in Maharashtra.	rainfed uplands as well as irrigated areas for Kharif and Rabi seasons in Konkan region of Maharashtra.	rainfed uplands and irrigated transplanted conditions in Maharashtra State.	and Maharashtra state
Specific	Tolerant to stem	Moderately	Resistant to leaf	Moderately
resistance/tolerance	borer	resistant to	folder,	resistant to
to pest		leaf folder	BPH,WBPH	stem borer
			and moderately	
			resistant to stem	
			borer	
Specific	Resistant to blast		Moderately	Moderately
resistance/tolerance	and moderately		resistant to blast	resistant to
to disease	resistant to BLB		and BLB	blast
	and brown spots.			
Specific tolerance	Suitable for high	Suitable for	Suitable for	Suitable for
to drought/water	rainfall zone	high rainfall	high rainfall	high rainfall
logging		zone	zone	zone

practices	Name of pest/disease	organic material used for control	Quantity/m ² area		
Organic plant protection	weeding Recommended				
Weed management	_	<i>lyricidia</i> green leav	res and mannual hand		
Irrigation practices		Rainfe	ed		
manures/other nutrient source/m ² of nursery	FYM	3 kg/m ² area	Soil incorporation before nursery sowing		
Source and optimum quantity of organic	Materials	Quantity/m ² area	Method of application		
	Trichoderma	5g/kg of seed	Seed treatment		
Pre-sowing seed/soil treatment	Materials Quantity/kg of seed or per m ² area Method of appli				
Seed sowing rate/m ²	$45 \text{ to } 50 \text{ g/m}^2$				
Bed size (length x breadth in m)	Length as per slope of the land (sloppy land less length, plane land more length) - Breadth- 1 m				
Nursery raising method	Wet nursery/Mat nursery/Raised bed method etc.				
1 ha					
Area of nursery required for	0.10 ha (1000m ²)				

	Different insect pests	Application of neem formulation	1500 ppm@5 ml/lit of water for two times
Optimum age of nursery (days)	22 to 26 days		

Field is ploughed for solar heating in the month of May. Second ploughing and clod crushing is done before monsoon with wooden plough or tractor or power tiller drawn cultivator. Puddling is done by wooden plough or tractor or power tiller drawn puddler. Bullock drawn *Pankaj* puddler developed by Dr. Balasaheb Sawant Konkan Krishi Vidyapeeth, Dapoli should be used for better puddling.

The field should be mannured with FYM and Neem cake @ 5 and 0.5 tonnes/ha, respectively before puddling. Similarly, 4.5 tonnes/ ha of *Glyricidia* green leaf and 4.2 tonnes/ha of rice straw be incorporated into puddled field prior to transplanting.

Pre-sowing/planting treatment of seed/seedlings	Material	Recommended rate (kg/ha or lit./ha)		Method of application	
	Phosphate PSB 2.5 kg solubilizing bacteria Azospirillui		g + um 2.5 kg	Seedling root dip for 20 to 30	
	(PSB) and Azospirillum	+ 100 lit of water/ha		minutes in the slurry	
Spacing (Row x Plant) in cm	and Lospit titim	20x1	5cm	Starry	
Number of seedlings/hill		3-4 seed	lings/hill		
Basal application of	Source		Quantity/ha		
organic manures including soil application	FYM		6670 kg /ha before puddling		
of bio-fertilizers, bio-	Glyricidia Green leaves		1220 kg /ha before puddling		
control agents etc.	Rice straw		5470 kg /ha soil incorporation before transplanting		
Irrigation practices	Rainfed during Khari	f and canal	irrigation d	uring <i>Rabi</i>	
Major weeds	Echinochloa crusgall	i (Phakhad)	, Echinoch	loa colonum	
	(Phakhad), <i>Cyperus</i> and <i>Ischane globossa</i>), Cyperus	rotundus (Lavala)	
Weed management	Critical stage of wee	ding	Recommended practice for organic condition		
	20 Days after transpla	anting	Cono- weeder hoeing		
	30 Days after transpl	30 Days after transplanting		Cono- weeder hoeing and	
	(Tillering)		manual hand weeding		
	60 Days after transplanting (Panicle initiation)		Manual ha	and weeding	

Organic plant	Name of the	Organic material
protection	pest/disease	recommended for control

practices		
Insect pests	Stem borer Case worm	 Ploughing and collection of stubbles and their composting after harvesting of rice. Use of tolerant and resistant varieties. Crop rotation with ground nut, <i>Dolichos</i> bean, cucumber and red pumpkin. Harvesting of rice close to the ground with <i>Vibhav</i> sickle developed by DBSKKV; Dapoli to kill the hibernating larvae. Use of pheromone traps @20 Nos./ha Release of <i>Trichogramma</i> @ 50000/ha for 4 times. Collection of egg masses and their destruction. Conservation and preservation of frogs in the field Timely transplanting
		 Intermittent draining out water from the field Flooding the field followed by dragging a rope across the field and draining out the water from the field
	Brown Plant Hoppers (BPH), White Backed Plant Hoppers (WBPH) and Blue beetle	 Use of tolerant and resistant varieties. Intermittent draining out water from the field Judicious use of nitrogenous fertilizers. Adoption of proper spacing (20x15cm) Formation of alley ways for every three meters for penetration of sunlight and proper aeration
	Army worm	 Deep ploughing after harvesting of crop to expose the hibernating stages of pest. Everyday inspection of the field during dry spell and at maturity. Keeping the bunds clean and free of weed in the beginning of the season. Digging the trench and flooding it with water for preventing migration of larvae from one field to another field. Erection of bird perches. Harvesting the crop immediately after it attains the maturity. Conservation and preservation of frogs in the field.
	Leaf eating caterpillars	• Erection of bird perches.
Diseases	Blast and sheath rot	 Use of tolerant and resistant varieties. Spraying of <i>Pseudomonas fluroscence</i> @ 8-10 g / lit of water [for 2-3 times] starting from maximum tillering to flowering stage.
	Bacterial leaf blight	 Use of tolerant and resistant varieties. Intermittent draining out water from the field. Judicious use of nitrogenous fertilizers.

	 Adoption of proper spacing (20x15cm)
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Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	20	12-13
Economic	3050	1260	4253	3676	3445	Grain	Straw
yield (kg/ha)	3030	1200	4233	3070		3236	3850
Price (Rs/kg) of 25% Premium prevailing mar	n on		(Grain : Rs.1. Straw : Rs.	C		
Cost of cultiva (Rs/ha)	tion	42016					
Net Returns (F	Rs/ha)	16263					

^{*}based on prices of 2013-14

Crop (Rabi): Red pumpkin

Important features of suitable varieties: MPH-1

Parameters	Variety :MPH-1
Duration (days)	95-100
Average yield under organic condition (kg/ha)	12500-13000 kg/ha
Source (s) of availability	RARS,Karjat
Suitable regions/districts in the state	Maharashtra state
Specific resistance/tolerance to disease	Tolerant to powdery mildew and downy mildew

Field preparation:

Ploughing the field after harvest of *Kharif* rice. Criss-cross cultivation and clod crushing with peg tooth cultivator to bring the soil into good tilth.

Cultural practices					
Seed rate (kg/ha)	6.5 kg/ha				
Pre-sowing/planting treatment of seed/seedlings	Material Recommended rate (kg/ha or lit./ha)		a or Method of application		
	Trichoderma	5g/kg of seed		Seed treatment	
	PSB	25g/ kg of seed		Seed treatment	
Spacing (Row x Plant) in cm	1.5 x 0.9 m				
Basal application of organic	Source			Quantity/ha	
manures including soil application	FYM		6670 kg/ha		
of bio-fertilizers, bio-control agents	Neem cake		650 kg/ha		
etc.	Vermicompost		2230 kg/ha		
Irrigation practices	Number of	Most critical		Depth of	
	irrigation	stage of irrigation		irrigation (cm)	
	10 irrigations	10 irrigations at an		60 cm	
		interval of 10 days		(6 cm/irrigation)	
Major weeds	Physalis minima (Ranpopati), Portulaca oleracea				

	(Motha ghol), Alternanther	(Motha ghol), Alternanthera sessilis (Reshimkata),			
	Blumea lacera (Bhamrud) :	Blumea lacera (Bhamrud) and Amaranthus viridis			
	(Ranti math)	(Ranti math)			
Weed management	Critical stage of weeding	Recommended practice			
		for organic condition			
	30-60 DAS	Hand weeding			

Organic plant protection practices	Name of the pest/disease	Organic material recommended for control	Quantity (kg or liters/ha)	
Insect pests	Red pumpkin beetle	• Spraying of neemicide	3ml/lit	
	Fruit fly	• Erection of Rakshak pheromone trap designed by DR. B.S.K.K.V. Dapoli.	4 Nos. / ha	
Diseases	Powdery mildew and downy mildew	Follow crop rotation.Maintain field sanitation.		
Optimum stage of harvesting	• 90 – 100 I	DAS		

Yield and economics:

Parameters	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
Economic yield (kg/ha)	17421	3369	11024	8450	12561	12726
Price (Rs/kg) consider 25% Premium on prevailing market price	Rs. 12.50kg/ha					
Cost of cultivation (Rs/ha)	85170					
Net Returns (Rs/ha)	73905					

Rice-Red pumpkin cropping system economics:

Gross Returns (Rs/ha)	Cost of cultivation (Rs/ha)	Net returns (Rs/ha)	B:C ratio	
217354	127186	90168	1.71	

^{*}based on prices of 2013-14