


Crop improvement programmes utilizing the indigenous and exotic germplasm conserved are in progress for the last three decades and has resulted in the development of over 150 improved varieties of spices which are capable of doubling the farmer's income. The improved varieties are identified for high yield, high quality, resistant/ tolerant to major pest and diseases. High yielding varieties enhance the income of the farmers as compared to the local cultivars. Industry demands high quality spice varieties for value addition and by growing such varieties, the farmers receive premium price. Varieties suitable for mixed cropping system ensure more income from an unit area, which also enhances farmers' income. Development of pest and disease resistant/ tolerant varieties minimizes the pesticide residues, reduces the operational expenses and ensures food safe spice production.




ICAR-AICRP on Spices

- First in the world to develop and popularize hybrids in black pepper and to demonstrate the concept of hybrid vigour in black pepper. Cultivar diversity is one of the principal components of diversity in black pepper, which is exploited in crop improvement programmes.
- First in the world to exploit the concept of seed development in turmeric. IISR Prabha and Prathibha are the first ever seed derived varieties of turmeric characterized by high yield and high curcumin and are gaining popularity throughout the country.
- First in the country to develop inter varietal hybrid of small cardamom ICRI- 5, an early flowering variety with dark green bold capsules, a preferable character in market.
- First in the country to develop, bisexual high yielding nutmeg variety, Konkan Sugandha, which eliminates the requirement of male trees in the plantation.
- First in the country (ICAR-AICRP Jobner centre) to use mutation breeding in seed spices to increase the spectrum of variation and many variant lines were developed.




During 2010-19, fifty one varieties of various spices with specific traits were developed and recommended for release from AICRPS. The varieties with specific traits are given below.







Institute/ University	Black pepper	
Pepper Research Station (KAU), Panniyur	<p>Panniyur 9- Black pepper variety with high yield potential (3150 kg ha⁻¹) and recommended for Kerala, Karnataka and Andhra Pradesh for its tolerance to <i>Phytophthora</i> foot rot, drought and cold stress. Recommended for release during 2016-2017.</p>	







Small cardamom

<p>Cardamom Research Station, KAU, Pampadumpara</p>	<p>PV3 (S 1)- Small cardamom variety moderately tolerant to drought, thrips and capsule borer with a yield of 611 kg dry capsules ha⁻¹ and 7.2% essential oil. Suitable for Kerala conditions. Recommended for release during 2014-2015.</p>	
<p>ICAR- Indian Institute of Spices Research, Calicut</p>	<p>Appangala 2- First <i>Katte</i> resistant hybrid of small cardamom (Malabar type) with an yield of 927.29 kg dry capsules ha⁻¹. It is a hybrid (Appangala 1 x NKE 19) with high oil (6.3%) and α terpinyl acetate (40.3 %) content. Recommended for release during 2014-2015.</p>	
<p>ICRI (Spices Board), Myladumpara, Kerala</p>	<p>ICRI 8- Small cardamom variety (Malabar type) suitable for rainfed conditions with life saving irrigation. Capsules are ovoid, bold and pale green. It is suitable for Kerala. Recommended for release during 2016-2017.</p>	


Ginger

<p>Uttar Banga Krishi Viswavidyalaya, Pundibari, West Bengal</p>	<p>GCP-49 (UBKV AADA 1)- Ginger variety with high yield potential (14 t ha⁻¹), bold rhizomes with dry recovery of 21.7%.. Recommended for all India release during 2017-2018.</p>	
<p>High Altitude Research Station (OUAT), Pottangi</p>	<p>V1S1-2 (Sourabh)- Ginger variety with plumpy cylindrical rhizome with short inter nodes. Has high yield potential (14 t ha⁻¹) and essential oil of 1.3%. Suitable for Odisha conditions. Recommended for release during 2016-2017.</p>	
<p>Dr YS Parmar Univ. of Horticulture & Forestry, Solan, Himachal Pradesh</p>	<p>Solan Giriganga- Plumpy and bold rhizomes with high dry matter recovery (21.01%). It has 1.45% essential oil, 4.69% oleoresin, 4.47% crude fibre and < 10% incidence of rhizome rot. Recommended for release during 2018-2019.</p>	


<p>ICAR- Indian Institute of Spices Research, Calicut</p>	<p>IISR Vajra- Ginger variety with plumpy and bold rhizomes having high essential oil (2.15%), 7.26% oleoresin, 5.67% crude fibre and 20.7% dry recovery. Owing to its high zingiberene content (29.83%) it has a desirable flavor and is suitable for growing in Kerala, Karnataka, Odisha and West Bengal. Recommended for release during 2020-2021.</p>	
<p>Turmeric</p>		
<p>N.D. University of Agriculture & Technology, Kumarganj, Faizabad</p>	<p>Narendra Haldi 3- Turmeric variety with high yield (32-35 t ha⁻¹) with good size fingers, root knot nematode resistance, and moderate resistance against leaf spot and leaf blotch. Suitable for Uttar Pradesh. Recommended for release during 2012-2013.</p>	
<p>Dr. Y. S. R. Horticultural University, Turmeric Research station, Kammarpally</p>	<p>Duggirala Red- Turmeric variety developed by mass selection for high yield (25 t ha⁻¹) with long, plumpy, strong rhizomes and very deep orange in colour. It is suitable for Andhra Pradesh. Recommended for release during 2012-2013.</p>	
<p>N.D. University of Agriculture & Technology, Kumarganj, Faizabad</p>	<p>NDH-98- Turmeric variety with tolerance to salinity and high yield potential (35-37 t ha⁻¹) with 4.3 - 5.2 % curcumin, 11.09 - 12.97 % oleoresin and 6.8 - 7.0 % essential oil. Recommended for release during 2016-2017.</p>	
<p>ICAR- Indian Institute of Spices Research, Calicut</p>	<p>IISR Pragati (Acc. 48)- Turmeric variety with high yield potential (33 t ha⁻¹), short duration (180 days), nature, moderately tolerant to root-knot nematodes and curcumin content of 5%. Recommended for release during 2016-2017.</p>	
<p>N.D. University of Agriculture & Technology, Kumarganj, Faizabad</p>	<p>Narendra Saryu- High curcumin content (5-6%), more number of primaries with yield advantage of 10% over the national check. Suitable for powder industry. Recommended for release during 2017-2018.</p>	

<p>Tamil Nadu Agricultural University, Coimbatore</p>	<p>CL 34- Turmeric variety tolerant to leaf spot and leaf blotch and with curcumin content of 3.3%. Suitable for Tamil Nadu conditions. Recommended for release during 2017-2018.</p>	
<p>Uttar Banga Krishi Viswavidyalaya, Pundibari, West Bengal</p>	<p>TCP 129- Tolerant to leaf spot and leaf blotch and with curcumin content of 5.1% and high dry recovery of 26.51%. Recommended for release during 2018-2019.</p>	
<p>Dr. Y.S.R. Horticultural University, Guntur, Andhra Pradesh</p>	<p>Lam Turmeric 1 (LTS-2) -turmeric variety having dark lemon yellow colour powder suitable for masala industry, high yield (40-42 t ha⁻¹) and high dry recovery. It performs well in Andhra Pradesh, Telangana and Tamil Nadu. Recommended for release during 2020-2021.</p>	
<p>Dr. Rajendra Prasad Central Agricultural University, Dholi, Bihar</p>	<p>Rajendra Haldi 1- dwarf stature, matures early and is high yielding (55-64 t ha⁻¹). It has high curcumin (6.08%), 7% essential oil and 13.32% oleoresin content. Suitable for growing in Bihar, Odisha and Andhra Pradesh. Recommended for release during 2020-2021.</p>	
<p>Nutmeg</p>		
<p>ICAR- Indian Institute of Spices Research, Calicut</p>	<p>Keralashree- Nutmeg variety with high yield, quality and extra bold fruit mace and nut. It is the first spice variety developed by participatory breeding program. Suitable for Kerala and other nutmeg growing areas of India. Recommended for release during 2013-2014.</p>	
<p>Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra</p>	<p>Konkan Sanyukta- Monoecious nutmeg bearing 500 fruits per plant per year with bold nuts (9.20 g), high nut oil (27%) and mace oil (17.75%). Recommended for release during 2018-2019.</p>	





Clove









Tamil Nadu Agricultural University, Coimbatore	PPI (CL) 1- First clove variety with dry flower bud yield of 5.2 kg/ tree, 6% oil content and 34.22% bark recovery. It is suitable for Tamil Nadu conditions. Recommended for release during 2012-2013	
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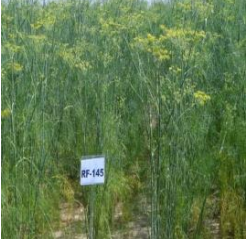




Cassia








Dr. B. S. Konkan Krishi Vidyapeeth, Dapoli, Maharashtra	Konkan Cassia- First cassia variety with low coumarin content and dry bark yield is 262.94 kg ha ⁻¹ . Suitable for cassia growing regions of the country. Recommended for release during 2017-2018.	
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Coriander



Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana	DH 220- Coriander variety with powdery mildew resistance. This variety has out yielded other varieties, Hisar Anand (national check) and local checks under coordinated varietal trials of AICRPS. Recommended for release during 2012-2013.	
Dr. YSR. Horticultural University Guntur, Andhra Pradesh	Suguna- Medium duration (90-95 days) coriander variety with high yield (13.5 q ha ⁻¹) and volatile oil (0.52%). Suitable for growing in Andhra Pradesh, Gujarat, Rajasthan, Tamil Nadu and Uttar Pradesh. Recommended for release during 2012-2013.	
Dr. YSR. Horticultural University Guntur, Andhra Pradesh	Suruchi- Off season coriander variety suitable for protected cultivation in summer with herbage yield of 4.5 t/ha. Recommended for Andhra Pradesh, Rajasthan and Tamil Nadu. Recommended for release during 2013-2014.	
N.D. University of Agriculture & Technology, Kumarganj, Faizabad	Narendra Dhania 2- Dual purpose variety of coriander developed through selection with seed yield of 17-19 q ha ⁻¹ . Suitable for Uttar Pradesh, Rajasthan and Gujarat. Recommended for release during 2014-2015.	

<p>SKN College of Agricultural University, Jobner, Rajasthan</p>	<p>RCr-475- Coriander variety developed through recurrent selection and is suitable for grain purpose with a yield of 17.40 q ha⁻¹. It is ideal for Rajasthan. Recommended for release during 2014-2015.</p>	
<p>Dr. YSR. Horticultural University Guntur, Andhra Pradesh</p>	<p>LCC 219 (Susthira)- Coriander variety with high yield (12-17.5 q ha⁻¹), medium duration suitable for rainfed (12.0 -14.3 q ha⁻¹) and irrigated (12-17.5 q ha⁻¹) condition. Recommended for release during 2015-2016.</p>	
<p>Dr. Rajendra Prasad Central Agricultural University, Dholi, Bihar</p>	<p>RD 385 (Dr. RPCAU Dhanial-1)- Coriander variety with high yield potential (17.63 q ha⁻¹) and high volatile oil (0.45%) moderately resistant to stem gall disease and resistant to lodging. Recommended for release during 2016-2017.</p>	
<p>Sardarkrushinagar Dantiwada Agricultural University, Jagudan, Gujarat</p>	<p>Gujarat Coriander -3- High yield (16.94 q ha⁻¹), high volatile oil (0.52 %) and high linalool (72.16%) content coriander suitable for Gujarat. Recommended for release during 2017-2018.</p>	
<p>ICAR-NRCSS, Ajmer</p>	<p>Ajmer Coriander 2- Coriander variety with stem gall resistance, high linalool content (71.7%) and early maturing type suitable for all coriander growing regions of the country. Recommended for release during 2017-2018.</p>	
<p>ICAR-NRC on Seed Spices, Ajmer, Rajasthan</p>	<p>Ajmer Coriander -3- Coriander variety with high volatile oil (0.55 %), high linalool (75.42 %), high (13.09 q ha⁻¹) and stable yield. Recommended for release during 2018-2019.</p>	
<p>Dr. Rajendra Prasad Central Agricultural University, Dholi, Bihar</p>	<p>Rajendra Dhanial 3- Climate resilient coriander variety with high yield (14.09 q ha⁻¹) and high oil (0.52 %). Recommended for national release during 2018-2019.</p>	
<p>JNKVV, Jabalpur</p>	<p>JD (SI)-1- High oil type coriander (0.67 %) with high yield potential (14.14 q ha⁻¹) suitable for Madhya Pradesh. Recommended for release during 2018-2019.</p>	

IGKV, Raigarh	Chhattisgarh Sri Chandrahansini Dhania-2- Climate resilient coriander variety suitable for both leafy and seed purpose, moderately resistant to powdery mildew and aphids. Recommended for release during 2018-2019.	
Cumin		
Sardarkrushinagar Dantiwada Agricultural University, Jagudan, Gujarat	Gujarat Cumin 5- Wilt resistant cumin with short duration and high yield (38 % higher yield than GC 4) suitable for cumin growing regions of the country. Recommended for release during 2018-2019.	
Fennel		
SKN College of Agricultural University, Jobner, Rajasthan	RF 145- Fennel variety developed through recurrent selection based on individual plant progeny (half-sib) from a local collection of Sidhpur (Sirohi) area. The plants are erect and medium tall with bold and attractive seeds and also have high volatile oil. Recommended for release during 2010-2011.	
Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana	HF- 143- High yielding (18-020 q ha ⁻¹) and high quality (2.4% essential oil content) fennel variety recommended for national release during 2012-2013.	
SKN College of Agricultural University, Jobner, Rajasthan	RF- 281- Fennel variety developed through recurrent selection. It has bold, attractive seeds, high volatile oil (2.58%) and matures in 130-140 days with a yield of 18.25 q ha ⁻¹ . Recommended for release during 2012-2013.	
ICAR-NRC on Seed Spices, Ajmer, Rajasthan	Ajmer Fennel-2 (AF-2)- Fennel variety developed through recurrent selection and has high yield (17.9 q ha ⁻¹) and essential oil content (1.9%). It has moderate resistance to <i>Ramularia</i> blight. Recommended for release during 2015-2016.	
SKN College of Agricultural University, Jobner, Rajasthan	RF-157- Fennel variety with high yield potential (21.67 q/ha) and better seed quality (volatile oil 1.95%) with long attractive and bold seeds. Suitable for Rajasthan, Gujarat and Haryana. Recommended for release during 2015-2016.	

<p>ICAR-NRC on Seed Spices, Ajmer, Rajasthan</p>	<p>Ajmer fennel 3- High yielding (21.43 q ha⁻¹) and high oil (1.9%) fennel resistant to <i>Ramularia</i> blight suitable for fennel growing regions of the country. Recommended for release during 2018-2019.</p>	
<p>SKN College of Agricultural University, Jobner, Rajasthan</p>	<p>RF 290- Fennel variety with high yield (20.65 q ha⁻¹) and long and bold seeds, more umbellets and seeds per umbel. Suitable for Rajasthan, Gujarat, Bihar, Haryana and Uttar Pradesh. Recommended for release during 2019-20.</p>	
<p>Fenugreek</p>		
<p>ICAR-NRC on Seed Spices, Ajmer, Rajasthan</p>	<p>Ajmer fenugreek 3- Fenugreek variety with 0.97 % 4- hydroxy isoleucine content in seeds and a yield of 13- 14 q ha⁻¹. It is suitable for fenugreek growing regions of the country. Recommended for release during 2012-2013.</p>	
<p>Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana</p>	<p>HM- 348- dual purpose fenugreek variety with high seed yield potential (20-22 q ha⁻¹) and leaf yield of 70- 72 q ha⁻¹. Moderately resistant to powdery mildew and has wider adaptability. Recommended for release during 2013-2014.</p>	
<p>Dr.YSR Horticultural University Guntur, Andhra Pradesh</p>	<p>Lam Methi 3- Fenugreek variety with yield of 12-26 q ha⁻¹, medium diosgenin content (0.31%) and suitable for rain fed condition. Recommended for Andhra Pradesh and Telangana. Recommended for release during 2014-2015.</p>	
<p>N.D. University of Agriculture & Technology, Kumarganj, Faizabad</p>	<p>Narendra Methi 2- Fenugreek variety with salinity tolerance and moderate resistance to <i>Cercospora</i> leaf spot and downy mildew. It yields 13-15 q ha⁻¹ and suitable for Uttar Pradesh. Recommended for release during 2015-2016.</p>	
<p>SKN College of Agricultural University, Jobner, Rajasthan</p>	<p>RMt-354- Fenugreek variety with high yield potential (15-16 q ha⁻¹) and is moderately resistant to powdery mildew and downy mildew. Suitable for all fenugreek growing areas of the country. Recommended for release during 2015-2016.</p>	

<p>Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana</p>	<p>HM 444 (Hisar Manohar)- Fenugreek variety with high yield potential and unique green seed colour. Possess resistance to powdery mildew and tolerance to downy mildew. Recommended for release during 2016-2017.</p>	
<p>ICAR-NRC on Seed Spices, Ajmer, Rajasthan</p>	<p>Ajmer Fenugreek 5- High seed yield (17.21 q/ha), high antioxidant content (66.428 mg/BHTE/ ppm) and suitable for green leaf production under shade net condition in summer season. Suitable for fenugreek growing regions of the country. Recommended for release during 2017-2018.</p>	
<p>Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana</p>	<p>HM 425- High yielding (20-22 q ha⁻¹) powdery mildew and downy mildew resistant fenugreek suitable for fenugreek growing regions of the country. Recommended for release during 2018-2019.</p>	
<p>N.D. University of Agriculture & Technology, Kumarganj, Faizabad</p>	<p>Narendra Richa- Dual purpose alkaline tolerant fenugreek with moderate resistance to powdery mildew, suitable for Uttar Pradesh and Andhra Pradesh. Recommended for release during 2018-2019.</p>	
<p>Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana</p>	<p>HM 257- high yielding (20-22 q ha⁻¹) and shows field resistance against downy mildew and powdery mildew diseases. It performs well in Haryana, Bihar, Rajasthan, Chhattisgarh and Gujarat. Recommended for release during 2020-2021.</p>	
<p>Ajwain</p>		
<p>Chaudhary Charan Singh Haryana Agricultural University, Hisar, Haryana</p>	<p>Hisar Ajwain 18- Ajwain variety with a yield of 12- 14 q ha⁻¹ and shows resistance to lodging and <i>Sclerotia</i> wilt disease. Recommended for release for Haryana during 2012-2013.</p>	

ICAR-NRC on Seed Spices, Ajmer, Rajasthan	Ajmer Ajwain 73: Ajwain variety for high yield (10.66 q ha ⁻¹) and high essential oil (6.38%). Suitable for Rajasthan, Gujarat, Chhattisgarh, Haryana, Andhra Pradesh and Uttar Pradesh. Recommended for release during 2019-2020.	
Nigella		
ICAR-NRC on Seed Spices, Ajmer, Rajasthan	Ajmer Nigella 1: Nigella variety for high yield (9.09 q ha ⁻¹) and high oleic acid (3.32%) content. Recommended for Rajasthan, Chhattisgarh, Haryana West Bengal, Uttarakhand and Uttar Pradesh. Recommended for release during 2019-2020.	

Varieties recommended for release from centres of ICAR-AICRP on Spices

Crop	Varieties developed during XI & XII Plan		Total no. of varieties released
	Name of the variety	No.	
Black pepper	Panniyur-8, Panniyur-9	2	19
Small cardamom	ICRI-8, PV-3, Appangala-2	3	16
Ginger	Subhada, GCP-49, V ₁ S ₁ -2	3	12
Turmeric	NarendraHaldi – 1, Surangi, NDH-3, Duggirala Red, IISR Pragati, NDH-98	6	30
Cinnamon	Nil	0	3
Nutmeg	IISR-Keralashree	1	4
Clove	PPI(CL)-1	1	1
Coriander	DH 220, Hisar Bhoomit, Suguna, Suruchi (LCC – 234), Narendra Dhanian-2, RCr 475, Susthira, RD 385	8	24
Cumin	RZ-345	1	8
Fennel	RF- 205, HF-143, Ajmer Fennel-2 (AF-2), RF 281, RF-157	5	12
Fenugreek	RMt- 361, Ajmer Fenugreek 3, HM 348, Lam Methi 3 (LFC-103), RMt-354, Narendra Methi 2 (NDM 69), HM 444	7	20
Ajwain	Hisar Ajwain 18	1	1
Total		38	150

Spice varieties for high yield

Crop	Variety	Yield	Variety	Yield
Black pepper	Panniyur 1	1242 kg/ha	Sreekara	2677 kg/ha
	Panniyur 2	2570 kg/ha	Subhakara	2352 kg/ha
	Panniyur 3	1953 kg/ha	Panchami	2828 kg/ha
	Panniyur 4	1277 kg/ha	Pournami	2333 kg/ha
	Panniyur 5	1110 kg/ha	IISR Shakthi	2253 kg/ha
	Panniyur 6	2127 kg/ha	IISR Thevam	2148 kg/ha
	Panniyur 7	1410 kg/ha	IISR Girimunda	2880 kg/ha
	Panniyur 8	5760 kg/ha	IISR Malabar Excel	1440 kg/ha
	PLD 2	2475 kg/ha		
Small cardamom	PV 2	982 kg/ha	ICRI 6	1200 kg/ha
	PV 3	611 kg/ha	IISR Suvasini	745 kg/ha
	ICRI 5	1543 kg/h	IISR Avinash	847 kg/ha
Ginger	Suprabha	16.6 t/ha	Aswathy	23 t/ha
	Suravi	17.5 t/ha	Athira	21 t/ha
	IISR Varada	22.6 t/ha	Karthika	19 t/ha
	IISR Mahima	23.2 t/ha	Subhada	18 t/ha
	IISR Rejatha	22.4 t/ha		
Turmeric	Co. 1	30.5 t/ha fresh	IISR Kedaram	34.5 t/ha
	BSR 1	30.7 t/ha	Narendra Haldi 1	30-35 t/ha
	BSR 2	32.7 t/ha	Narendra Haldi 2	35-40 t/ha
	Rasmi	31.30 t/ha	Narendra Haldi 3	32.50-35.0 t/ha
	Rajendra Sonia	42.0 t/ha	NDH 98	35-37 t/ha
	IISR Prabha	37.47 t/ha	IISR Pragati	33.19 t/ha
	IISR Prathibha	39.12 t/ha	Kanthi	37.65 t/ha
	IISR Alleppey Supreme	35.4 t/ha	Sobha	35.88 t/ha
Nutmeg	Konkan Sugandha	500 fruits/tree	IISR Vishwashree	1000 fruits/tree
	Konkan Swad	725 fruits/tree	IISR Keralashree	2000 fruits/tree
Cinnamon	Konkan Tej	80 g/tree/year dried bark	IISR Nithyashree	200 kg dry quills/ha
	IISR Navashree	200 kg dry quills/ha	Sugandhini	1.2 kg fresh/tree/year
Coriander	RCr 435	10.00 q/ha	Hisar Sugandh	14.00 q/ha
	RCr 436	11.00 q/ha	Hisar Surabhi	18.00 q/ha
	RCr-446	12.00 q/ha	Hisar Bhoomit	14-15 q/ha
	RCr-480	18.0 q/ha	Narendra Dhania 2	19-19 q/ha
	Sadhana	10.25 q/ha	RCr 475	17.40 q/ha

	Sindhua	10.00 q/ha	Susthira	12-17.5 q/ha
	HisarAnand	14.00 q/ha	RD 385	17.63 q/ha
Clove	PPI (CL) 1	Dry flower bud 5.2 kg/tree		
Cumin	Guj. Cumin 2	6.20 q/ha	RZ-209	6.50 q/ha
	Guj. Cumin 3	6.20 q/ha	RZ-223	6.00 q/ha
	Guj. Cumin 4	12.50 q/ha		
Fennel	Guj. Fennel 2	19.40 q/ha	Pant Madhurika	18.00 q/ha18.00 q/ha
	RF 101	15.50 q/ha	Gujarat Fennel - 11	24.87 q/ha24.87 q/ha
	RF 178/UF 178	16.00 q/ha	JF-444-1	25.88 q/ha25.88 q/ha
	Hisar Swarup	16.00 q/ha	Ajmer Fennel 2	17.90 q/ha
	Azad Saunf-1	18.00 q/ha	RF-157	21.67 q/ha
Fenugreek	Hisar Sonali	17.00q/ha	RMt.1	14.00 q/ha
	Hisar Suvarna	16.00 q/ha	RMt 303	19.00 q/ha
	Hisar Madhavi	19.00 q/ha 19.00 q/ha	RMt-305	13.00 q/ha
	Hisar Mukta	20.00 q/ha	RMt-351/UM-351	18.40 q/ha
	Guj. Methi 1	18.60 q/ha	RMt- 361/UM- 361	18.41 q/ha
	Guj.Methi-2/Guj.Fenu.- 244	19.20 q/ha	HM - 348	20.00-22.00 q/ha

VARIETIES	SHOOT TIP	LEAF	SPIKES	DRY BERRIES
PANNIYUR 1				
PANNIYUR 2				
PANNIYUR 3				
PANNIYUR 4				
PANNIYUR 5				
PANNIYUR 6				
PANNIYUR 7				
PANNIYUR 8				
PANNIYUR 9				

Black pepper varieties released from Pepper Research Station, Panniyur

High quality varieties- industry's need

Being a high value, low volume and export oriented commodity, spices are marketed in the form of value added products, the industry seeks varieties with high quality for extraction of oils, oleoresins, curcumin etc. Hence, cultivation of high quality varieties boosts farm income significantly through realizing premium price.

Spice varieties for high quality

Crop	Varieties
Black pepper	Quality of black pepper is measured in terms of piperine, oil and oleoresin content. PLD 2 variety contains 15.45% oleoresin and 4.8% essential oil. Sreekara and Subhakara are rich in essential oil with 6.0 and 7.0% respectively. IISR Malabar Excel is rich in oleoresin (13.5%).
Small cardamom	Market value of cardamom is decided by its appearance and size. Malabar types are characterized by globose-oblong shaped capsules and Mysore types are of ovoid, bold and dark green capsules. IISR Avinash has bold dark green capsules and ICRI 8 has essential oil of 8%
Ginger	Varieties with low fibre viz., Suprabha, Hingiri and IISR Varada are suitable for fresh ginger. Essential oil is one of the major quality characters of ginger and varieties such as Athira, Karthika and Aswathy are rich in essential oil (>3%).
Turmeric	Curcumin is one of the important quality parameters and varieties rich in curcumin content are Roma (6.1%), Suroma (6.1%), IISR Prathibha (6.2%), IISR Prabha (6.5%), Megha Turemric-1 (6.8%), IISR Alleppey Supreme (5.5%) and IISR Pragati (5%).
Coriander	High quality lines with high essential oil content: RCr-480 (0.425%), Sudha (0.40%) Sindhu (0.40%), RD 385 (0.45%).
Cumin	Guj. Cumin 3 (4.4%), Guj. Cumin 2 (4.0%) and RZ-341 (3.87%) are the varieties with high volatile oil. RZ-223 is a variety with long bold attractive seeds. Ac-01-167 is another bold seeded variety.
Fennel	RF- 205 (2.48 %), HF 143 (2.4%), RF 281 (2.58), Guj. Fennel 2 (2.4%) and RF-178 (2.13%) are the varieties with high essential oil. RF-157 is a variety with long, attractive, bold seeds with volatile oil content of 1.95 %. Pant Madhurika is a variety with sweet seeds and green fine ridges.
Fenugreek	HM 444 has unique green seeded colour. Guj. Methi-2 (Guj.Fenu.-244) and RMt-351(UM-351) are varieties with bolder lustrous grains and uniform in size.

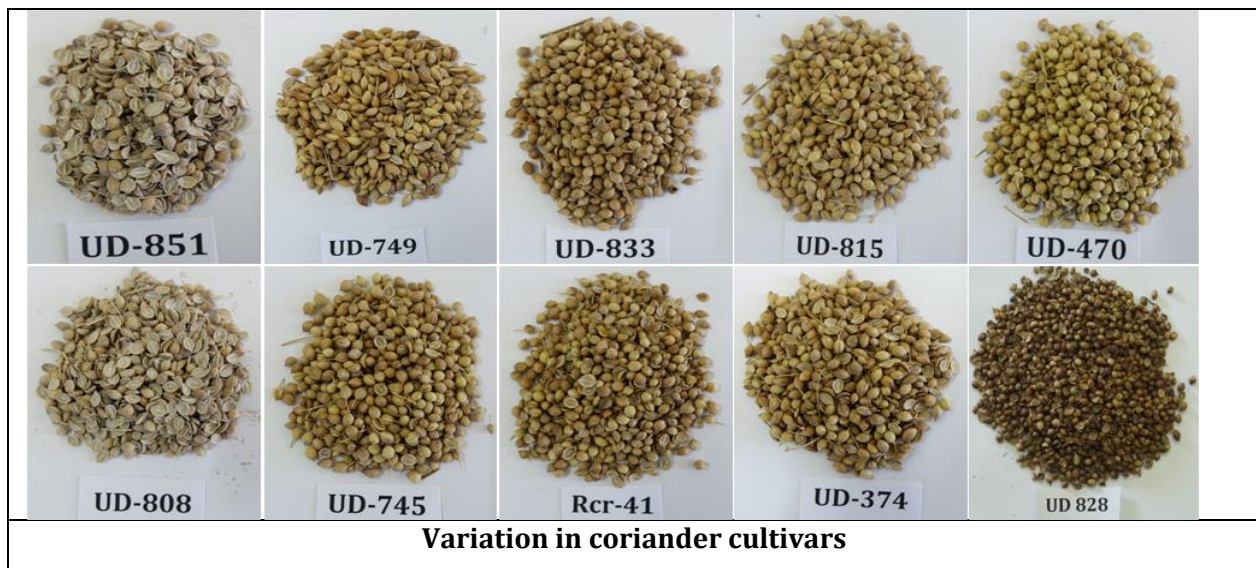
VARIATION IN OVEN DRIED POWDERS FROM RHIZOMES OF SOME GERmplasm LINES



Variation in powdered samples of turmeric

Dual purpose varieties of seed spices- *bonus for the farmers*

Dual purpose (for seed and leaf) varieties and the varieties suitable for off-season production in case of coriander and fenugreek offer high income to the farmer by giving a choice to sell the produce based on the market preferences. Hisar Anand, Hisar Bhoomit, Sadhana, Co.3, Narendra Dhania-2 are the dual purpose varieties of coriander whereas Hisar Sonali, Hisar Suvarna, Hisar Madhavi, HM 348 are the dual purpose varieties of fenugreek. The determinate types in fenugreek (RMt 305) and the uniform maturing type in fennel (JF-444-1 and Gujarat Fennel 12) will help to reduce the harvesting cost and these varieties are suitable for mechanized harvesting.



Varieties resistant to abiotic stress- *for overcoming climatic vagaries (climate resilient varieties)*

Spice varieties resistant to abiotic stress

Crop	Varieties
Black pepper	Drought is one of the limiting factors in black pepper cultivation in India and the varieties viz., Panniyur 6 and Panniyur 8 are field tolerant to water stress. Panniyur 7 is suitable for open and shade condition
Small cardamom	ICRI-5 and ICRI-6 varieties are tolerant to drought. PV3 is moderately tolerant to drought
Turmeric	NDH 3 and NDH 98 are saline tolerant varieties
Coriander	RCr-480 tolerant to frost, Sindhu is tolerant to drought
Cumin	Gujarat Cumin 3 (GC-3) is a frost resistant variety suitable for winter season

Varieties resistant to biotic stress- for food safe spice production

Spice varieties resistant to biotic stress

Crop	Varieties
Black pepper	<i>Phytophthora</i> foot rot is one of the major constraints in pepper cultivation and crop improvement programmes have resulted in development of 3 varieties viz., IISR Shakthi, IISR Thevam and Panniyur 8 which are field tolerant to this disease. Pournami variety of black pepper is tolerant to root knot nematode (<i>Meloidogyne incognita</i>).
Small cardamom	<i>Katte</i> disease of cardamom is one of the very important diseases. IISR Vijetha is the first <i>katte</i> virus resistant variety and Appangala 2 is the first hybrid resistant to <i>katte</i> virus. IISR Avinash is tolerant to rhizome rot suitable to cardamom growing regions of Karnataka and Wayanad of Kerala.
Ginger	IISR Mahima is resistant to nematode, <i>M. incognita</i> and <i>M. Javanica</i> pathotype 1. Athira and Karthika are tolerant to soft rot and bacterial wilt diseases.
Turmeric	Suranjana is tolerant to leaf blotch and rhizome rot, resistant to rhizome scales and moderately resistant to shoot borer. IISR Alleppey Supreme and IISR Kedaram show tolerance to leaf blotch disease. Narendra Haldi 3 and IISR Pragati are tolerant to root-knot nematodes.
Coriander	Hisar Bhoomit, Hisar Sugandh and RCr 684 are resistant to stem gall disease which severely affects the coriander crop. Co.3 variety of coriander is field tolerant to powdery mildew, wilt and grain mould. Sadhana is an improved variety with field tolerance to diseases and white fly, mites & aphids.
Cumin	Gujarat Cumin (GC 4) is the first high yielding wilt resistant cumin variety which covers over 70% area in Gujarat and majority areas in Rajasthan also. GC-3 is also resistant to wilt and frost. Ac-01-167 is a bold seeded variety resistant to wilt.
Fennel	Azad Saunf-1 is resistant to blight and root rot diseases and it escapes attack of aphids due to early maturity. Ajmer Fennel-2 (AF-2) is moderately resistant to <i>Ramularia</i> blight. Ajmer Fennel 1 is tolerant to <i>Ramularia</i> and <i>Alternaria</i> blight.
Fenugreek	RMt- 305 and RMt-351 are resistant to powdery mildew and root knot nematodes. Hisar Sonali is moderately resistant to root rot and aphids. Hisar Madhavi, Hisar Mukta and RMt-354 are moderately resistant to powdery mildew and downy mildew. RMt. 1 is moderately resistant to root knot nematode. Narendra Methi 2 (NDM 69) is moderately resistant to <i>Cercospora</i> leaf spot and downy mildew.