

**Cultivation of Rabi crops..... (Referred by Dr.D.G. Ingole & Guided by A.S. Wadhai)**

Crop, Origin, Edible Part	B.N. & Family	Economic Importance	Soil	Climate	Varieties	Seed and Sowing	Nutrient Management (N:P <sub>2</sub> O <sub>5</sub> :K <sub>2</sub> O Kg/ha)	Water Management	Maturity Indices	Harvesting and Yie
<b>Cereal Crops</b>										
Wheat S-E Asia Grain	<i>Triticum aestivum</i> poaceae	Wheat protein Gluten, baking quality	Clay-loam to loamy soils neutral soils	Tropical to temperate 20-25°C-Germ. 14-15°C-Ripening	Sonalika Kalyansona HD-2380 Lerma Rojo Chhoti Lerma Sarhali Sonara	SR-80-100 Kg/ha Sp-22.5 x 5cm SM-Drilling ST-2 <sup>nd</sup> FN Octo-Nov.	80-40-40	CRJ-20-25 DAS Tillering-40-45 DAS Jointing-70-75 DAS Flowering-90-95 DAS	Hard grain consistency with 25-30% moisture	Plants are harvested near ground by sickle 20-25 qts/ha-Rainfed 45-55 qts/ha-Irrigated
Barley S.E-Asia Grain	<i>Hordeum vulgare</i> poaceae	Mating quality CHO-74% Fats-1.3% Drought & Salinity Res.	Clay-loam to loamy soils neutral soils	Sub tropical, Warm & dry	Pragati Geetanjali Harima Rekha Rama	SR-80-100 Kg/ha Sp-22.5 x 5 cm SM-Drilling ST-Oct-Nov	80-40-40	2-3 Irrigations	Hard grain consistency with 25-30% moisture	Plants are harvested near ground by sickle 30-35qts/ha
Maize Mexico Grain	<i>Zea mays</i> poaceae	Queen of Cereal 10% Protein 70% CHO 2-3% Crude fiber	Well drained Alluvial soil. Silt loam, pH 5.5-7.5	Warm & Dry, Germ. -21°C, Growth-32°C, An.Rainfall 500-750 mm	Hybrid-Doccan 103,107, Ganga 2,11, Pusa H-12, Camp-Prabhat Panchganga	SR-20-25 Kg/ha Sp-Hyb. 60 x 20 cm Camp- 60 x 25 cm SM-Dibbling ST-After 15 October	120-60-60	Tasseling & Silking	Hard grain consistency with 20-22% moisture	20-25 qts/ha
Rabi sorghum S-Africa Grain	<i>Sorghum bicolor</i> poaceae	Camel Crop Food & fodder. 7 to 10% Protein. 70% CHO	Clay loam, Alkaline pH 6-8.5	Warm Climate Germi. -7-10°C Growth. 26-30 °C A rainfall 600-1000mm.	CSH-1,9, Pusa-chari, Rachira, CSV-15	SR-12-14 Kg/ha Sp-45 x 15 cm SM-Drilling ST-Octo-Nov	120-60-60	Blooming, Grain Filling.	Hard grain consistency with 20-22% moisture	25-35 qts/ha
<b>Pulse Crops</b>										
Chickpea S-W Asia Grain	<i>Cicer arietinum</i> Leguminosae	21% Protein. 61% CHO 4.5% Fat. Ca, Fe & Niacin	Sand-loam, Clay-loam. ~8.5 pH.	Temperate Climate 600-900 mm Rainfall	Ayrodhi Vijay, Gaurav, JG-74, Vishal, Pusa-1053 JAKI-9218	SR-75-100 Kg/ha Sp-30 x 10 cm SM-Drilling ST-2 FN Octo.	25-50-30	Pre-Flowering Pod development	Leaves fall Yellowing of pods Well developed grains	2cm-Long Pod. 50-150 pods/Plant. 20-25 qts/ha
Pea Mediterrians Grain	<i>Pisum sativum</i> Leguminosae	Green Vegetable. Queen of pulse. Digestible protein. Vit-A, Vit-C	Well drained Loamy soil. 6.5 pH.	Mild Temperature. Germ. 22°C Growth: 13-18°C	Rachana, Arpana, Sikha, Uttara.	SR-60-80 Kg/ha Sp-30 x 10 cm SM-Drilling ST-2 <sup>nd</sup> FN Oct	20-30:65-70:30-40	Flowering & Pod Filling	Leaves fall Yellowing of pods Well developed grains	20-25 qts grains/ha

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Lentil Asia minor Grain	<i>Lens esculenta</i> Leguminosae	Rich in Ca, Fe & Nicotin. Used as cover crop Protein 24-26% Fat 1.3% CHO 52%	Light loam to black cotton. Well drain loamy soils with neutral reaction.	Cool temp. vegetative phase. Warm temp. maturity. Opt temp 18-30°C	Pusa L-234,406, Pusa 8 VL kanti-4	SR-30-35 Kg/ha Sp-30 x 10 cm SM-Drilling ST-15 Octo-13 Nov.	20-25-50-60-60	Pre-Flowering & Pod Filling	Brownish pods	Harvesting is done cutting plant to ground level & sun dry on floor & threshed 20-25 qts grains/ha.
French bean Central America Grain	<i>Phaseolus vulgaris</i> Leguminosae	Protein 22.9% Fat 1.3% CHO 60.6 Rich in Ca, P & Fe	Light sand to heavy clay soils Clay loam to heavy pH: 5.5-6.5	Germ. 18-24°C Growth: 16-21°C Sensitive to frost & very high temp.	Comender, Aaka Komal Pusa Anupama	SR-80-90 Kg/ha Sp-45 x 15 cm SM-Dribbling ST-Jan-Feb	100-120-80-60	Pre-Flowering & Pod Filling		Green pod-80-100 qts/ha Grain yield-15-20 qts/ha.
<b>Oilseed Crops</b>										
Sunflower Mexico Grain	<i>Helianthus annuus</i> Asteraceae	45-50% Oil. Wider adaptability Drought Tolerant. 64% Linoleic acid.	Loamy. Good drainage. 6.5-8.5 pH	Cool & Warm. Photo sensitive	Dadhab. Surya. Divyanshu. Co-1, Co-2	SR-8-10 kg/ha Sp-60x70 cm SM-Dribbling ST-2 <sup>nd</sup> EN octo	60-80-60-40	Five Leaves-40 DAS. Flowering 75 DAS. Grain Filling 110 DAS	20% Moisture. 100-120 DAS. Head-yellow. Brown.	Removal of head by sickle 20-25 qts/ha
Safflower India Grain	<i>Carthamus tinctorius</i> Asteraceae	Dye Preparation. 24-36% oil. 78% Linoleic acid.	Deep soil. Well drain fertile Neutral pH	Cold climatic. Germ. 15.5°C Growth 24-32°C Ann Rainfall 600-900 mm	Mangra. N-7 Malvi	SR-15-20 kg/ha. Sp-45x5 cm. SM-Drilling ST-Oct-Nov	40-40-20	Flowering. Grain Filling	20% Moisture. 100-120 DAS. Head-yellow. Brown.	120-140 DAS. Yellow Leaves & stem. Rainfed: 6-8 qts/ha Irrigated: 15-20 qts/ha.
Mustard Afghanistan Grain	<i>Brassica juncea</i> L. Cruciferae	Oil 37-49% Oil as Condiments Pickles. Soap making. As Lubricants.	Sandy-Clay loam. Best light loamy Soil with neutral pH	Trop-sub-tropical Cool-dry weather Rainfall-350-450 mm	Kardam. Pusa Indar. Kardam. Pusa Jankigan	SR-1.5-2 kg Sp-15 x 15 cm SM-Drilling ST- Last week Sept.	60-90-60-40	1 <sup>st</sup> Pre-blooming 2 <sup>nd</sup> pod filling	Pod yellow brown	20-25 qts/ha
Linseed S-W Asia Grain	<i>Linum usitatissimum</i> Linaceae	Named as flax in Western Country Oil-37-47% Mfct. Paints varnishes soap Protein-26%	All type Heavier alluvial loam soils pH-5-7 Tel. Acid and salts	Cool season Ideal temp. 21-28°C Ann Rainfall 450-700 mm	NL-97 Nilam Hira Mukta Humaina Garima	SR-10-15 kg/ha SP-20-30 x 5 cm SM- Drilling ST- 1 <sup>st</sup> WK Octo-1 <sup>st</sup> WK Nov.	25-12.5-00	1 <sup>st</sup> irrigation-35 DAS 2 <sup>nd</sup> irrigation-65 DAS	130-150 DAS	8-10 qts/ha.
<b>Sugar Crops</b>										
Sugarcane New Guinea Juley canes	<i>Saccharum officinarum</i> Poaceae	Cash crop Juice for jaggery Press mud, soil reclamation and in paper industry	Sandy loam Clay loam Well drain Saline soil	Warm & Humid Tropical Temp-26-32°C. 750-1200 mm	Co-740 Co-1144 Co-1154	SR-40,000 qts/ha SP-90-120 cm SM-flat bed planting ST-Autumn: Nov-Dec Spring: Jan-Feb Adult: July-August	150-200-30-100-60-23	Germ. up to 60 DAS. Formative 60-120 Gr. growth 130-250	Drooping of top leaf yellowing of GN leaves	Retractometer 17-18" 200-1000 qts/ha Adult: 1000-1200 qts/ha

Sugar beet Bacterioma Tuber	<i>Beta vulgaris</i> Chenopodiaceae	60% Sugar 10% CP 60% TDN Antibiotic Feed additive.	Well drain. Sandy loam Prefer Drained	Cool climate 12-45°C Grows 15°C Grows 20-22°C	Marble Maripoly Mullinspoly RBC.	SR-8-10 Kgha SR-Flat bed 50 x 15 cm SM-Dibbling ST-2 <sup>nd</sup> QMS 1 <sup>st</sup> Nov.	120-80-80-100	130 Irrigations One-Two Thinning Sub seq. 20-25 Days of interval.	Harvest By Sowing 500-700 g/ha
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Commercial Crops

Potato Para S-America Tuber	Solanum tuberosum Solanaceae	King of vegetable Poor man's bread. Starch V-C, B-complex Carbo-20.6% Protein 2.1% Fat 0.3% Dry food chips.	Frillie asexual Rich in Humus Light soil 5-6.5 pH	Cool Temperature Tuber Growth 11-19°C	Annual Chillies Bansan	SR-28-25 qts/ha SR-55-60 x 20-23 cm SM-Hillings & Fitted ST-Oct-20/9	150-150-80-150-120- 150	8-12 irrigations and 3-4 hr. medium heavy.	Harvest fall on the ground	Harvest Yellow Fall on Ground Furrow digging. Yield: 200-400 qts/ha
Tobacco Mexico Leaves	Nicotiana glabrum Solanaceae	Cash crop, Leaves as Cured Product.	Well drained Mod. Acidity-5.5 to 6.5 pH Susceptible to water logging Rich in NO <sub>2</sub> %	Tropical climate Grows-27-32°C Rainfall-1000-1200 mm	Flue cured TB Virginia Tobacco Gambona Durova Chemical Tabac- Yacht Special Puro tobacco Frabba	Transplanting-2 <sup>nd</sup> FN August SR-2-3 kg/ha	50-120-00	1 <sup>st</sup> Irrigation establishment 2 <sup>nd</sup> & 3 <sup>rd</sup> weekly interval	Leaves colour changes from green to yellowish green	Withering 2-3 weeks Fire to six weeks Stalk cut: Stear in the green

Forage Crops

Lucerne S-W Asia Seculent parts	<i>Medicago sativa</i> Leguminosae	Queen of forage Also known silage Green gold	Sandy loam to clay well drained deep heavy soil in Ca pH-5.5-8.8	Cool climate Grows-13-15.5°C Frosts-18-21°C Acidic soils are not suitable	Sera No.89 Rambler Avalon-2.3 ICPRL-244	SR- Early Octa-Nov SR- 25-30 kg/ha SR- Drilling Sp- 15-35 cm-R-R	20-60-120-80	15-18 irrigations in year 1 pre-flowering Irig.	50% flowering	1 <sup>st</sup> cut-50-60 DAS Yield: 850-900 qts Seed yield: 4-5 qts
Herbert Egypt Seculent parts	<i>Trifolium alexandrinum</i> Leguminosae	20% CP 70% TDN highly physical, biological soil structure Use as smother crop	Well drained mud, Lean rich in Ca & P Frosts: About 10°C Acidic soils are not suitable	Warm and cool Grows-13-15.5°C Frosts-18-21°C Acidic soils are not suitable	Para plant, para viald viald	SR- 2-30 kg/ha ST- 11N October Sp- 20 cm-R-R	20-25-50-60-00	At an interval of 10-15 days	50% flowering	1 <sup>st</sup> cut-50-55 DAS 2 <sup>nd</sup> cut-25-35 days Yield:800-1000 qts Seed yield: 4-6 qts

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Maize Mexico Succulent parts	<i>Zea mays</i> Poaceae	King of fodder CP-6.47% CF-85-95%	Alluvial, red and black soils	Min. temp. 10°C Rainfall_600 mm	African tall Ganga Safed-2 GS-5	SR-40-50 kg/ha ST: Sept-October SM: Drilling Sp: 25-30 cm-R-R	60:30:20	20 irrigations Irrigation@3-7 days interval	Dough stage	350-400 q/ha
Oat Asia minor Succulent parts	<i>Avena sativa</i> Poaceae	It food for men & fodder for animal Green Fodder: 10-12% protein 30-35% dry matter.	Fertile & well drained loam to clay loam soil are best pH 6.0-8.5	Cool & moist climate Min. temp. 4-15°C Max. temp. 20-27°C	Kent Weston-11 UPO-94 HFO-114	SR-75-80 kg/ha ST-Mid Oct - Nov. SM-Drilling SP-20-25 cm.	90-120:40:20	1 <sup>st</sup> pre sowing irr. Flowering stage.	Dough stage	Harvesting should be done 50% at flowering. 1 <sup>st</sup> cutting at 35-60 D 35-40 ton/ha.
Sorghum South Africa	<i>Sorghum bicolor</i> Poaceae	Palatable, 2-3 ratoonnings Good silage	Red black to heavy soils	Tropical climate Min. temp. 35°C Rainfall_600 mm	IGFRI-99,1 Mekawi	SR-25 kg/ha ST: Sept-October SM: Drilling Sp: 20 cm R-R	20:60-80:30	16-18 irrigations Irrigation@ 5-7 days interval	Dough stage	1000-1200 q/ha

### Medicinal and Aromatic Crops

Mentha Mediterranean Leaves	<i>Mentha arvensis</i> Labiatae	0.4-0.6% oil Methyl- 60-70% Methyl acetate-12-15%	Well drained deep organic sandy loam to clay loam pH: >8.5	Sub-tropical and tropical climate	Himalaya Gomati Kosi Kiran MSB-1,5	SR-400-500 kg suckers ST: 1 <sup>st</sup> week January Sp: 30 x 10 cm	100-120:60:60			Harvesting: 100-120 Yield: 25-30 ton/ha
Lemon grass India Leaves	<i>Cymbopogon flexuosus</i> Poaceae	Mix. of scents, medicines, hair oil and perfumes Detterpinol-0.40% Fenestal-3.0% Citral-B-27.7% Fenestol-12.8%	Sandy loam to clay loam	Sub-tropical and tropical climate	Sapindi Pragati Priman Kaveri RRL-16 CKP-25	SR-20-25 kg/ha ST: 1 <sup>st</sup> N October Sp: 30 x 30 cm 60 x 45 cm	60:40:35			90 DAP& sub-sequent harvested at 50-55 later Yield: 1 <sup>st</sup> yr_ 25 kg oil/ha 2 <sup>nd</sup> yr_ 350-400 kg oil/ha
Citronella USA Leaves	<i>Cymbopogon winterianus</i> Poaceae	60-71% Alcohol. Oil 12-18%	Sandy loam soil are suitable for citronella. pH 5.8-8.0.	Tropical & sub trop. Avg rainfall 200-250mm.	Joibat-C-2. Jara-2. Mandakini Marjusha.	SR-2.7Lakh Slips. ST-may-jun. SP-60x60. SM-Planting.	120:60:60	8-10 irrigations	8 to 10 Month DAP.	Leaves 1st yr 13-30 ton. 2 <sup>nd</sup> yr 20-25 ton. Oil yield 100-150 kg/ha 2 <sup>nd</sup> yr 200-250 kg/ha