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Shri Adams Prakash.

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JMD
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W H E A T

General

Wheat, the staff of life for millions all over the world, is equalled only by rice as the most important cereal crop. In India, it is grown on an area of about 24,000,000 acres, and is surpassed in acreage by rice and by the millets. Its cultivation extends from the northern mountains, where it is cultivated to up to altitudes of about 9,000 feet, to peninsular India, and from the western areas to Assam in the east; it occupies 76 per cent of the area under winter cereals and 12 per cent of the area under all cereals; one-seventh of the total production of cereals is constituted by wheat grain. It is particularly important in the northern states where it is often the chief source of income of the farmers. Having the highest protein content it is important among the major cereals from the viewpoint of food value.

Triticum vulgare, the bread wheat, is the most important species, followed by macaroni wheat, Triticum durum which is ~~the~~ widely grown in parts of central and peninsular India. Triticum dicocum is grown ~~in part~~ to a limited extent in the Nilgiri Hills (South India) and in the neighbouring areas of Hyderabad, Bombay, Mysore, and Madras; Triticum sphaerococum occurs as traces in crops of the Triticum vulgare.

Climate

Wheat is adapted to a wide variety of climatic conditions but the best wheat-producing region is the north Indian plain with a growing period of 5 - 6 months and a cool winter. Frost at flowering time is little to damage crops in parts of North India; hailstorms and drought are also factors adversely affecting production, the latter in non-irrigated areas. The quality of grain produced in.....

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produced in the drier areas is generally superior to that from humid or irrigated parts.

Soil

Although wheat can grow on almost all types of soil it prefers well-drained loamy soils. The three main wheat-growing divisions are : Gangetic alluvium of Uttar Pradesh and Bihar; the Indus alluvium of East Punjab and the black soil tract of Peninsular India comprising Madhya Bharat, Madhya Pradesh, Hyderabad, and parts of Bombay. Thirty to fifty per cent of the Indo-gangetic alluvium region is irrigated, whilst the crop in Peninsular India is mostly rainfed. Wheat does best in fields where the fertility has been properly maintained and irrigation is available.

Vindhya Pradesh, Saurashtra, Rajasthan,

Seed-bed

The wheat seed-bed should have a fine mellow texture, be free from weeds and stubbles, and should have sufficient moisture to ensure good, uniform germination. The method of preparing the seed-bed varies with the soil conditions and whether irrigation is available. Preparation of land for wheat cultivation should be started as early as possible; opening of land during the dry summer months by 5-6 ploughings done in the early monsoon period by a bullock cultivator to reap down the weeds, hours of the morning improves soil condition and results in higher yield and better quality grain. Ploughings done after the monsoon rains should be followed by planking or beaming. In black cotton soil, a bladed hoe (bhakar) is used instead of the plough, for preparing the land; this is done in April-May and again in September-October after the rains and before wheat sowing.

Seeding

Wheat seed is sown in three ways, broadcasting, dibbling, or drilling. Dribbling and drilling are preferable to broadcasting, because these ensure the sowing at proper depth and spacing which results in better germination and better stand. The seed-rate

by deep fallow, kept constantly cultivated,

to conserve soil moisture

required is also less with drills and line sowing has the added advantage of facilitating hoeing, etc. The depth of sowing is important for proper germination. Generally speaking, deeper sowings are necessary in rough, dry and light soils while comparatively shallower sowings are desirable on moist or heavy soils. The distance from row to row in general, should be 9", although it may vary from place to place according to local conditions.

Time of sowing

The timely sowing of wheat is very important; late sowings result in poor quality and low yields. Sowing of wheat starts as early as September in some areas and goes upto December in different areas depending upon climate and local conditions. The sowing dates for the main wheat growing States are as follows :

optimum ?

optimum?

Bihar	October-November
Bombay	October-November
Madhya Pradesh	Sept. October-November
Panjab	October-November
Uttar Pradesh	October-November
Madhya Bharat	October

Seed rate

The seed rate varies according to the local

conditions, soils, and implements used for sowing. In general, the seed rate of 80 lbs. per acre is used.

Short growing period, lower fertility, poor irrigation facilities, delayed sowing, tend to increase the seed rate while the more favourable conditions at the sowing time, the use of improved implements for sowing, tend to decrease the seed rate. With the dibbling method, however, the optimum seed rate for different States is as follows:

Bihar	60 lbs.
Bombay	40-50 lbs.
Madhya Pradesh	50-80 lbs.
Uttar Pradesh	70-80 lbs.
Panjab	60-80 lbs.
Hyderabad	40 lbs.
Madhya Bharat	40-80 lbs.
Delhi	80 lbs.
Vindhya Pradesh	80 lbs.

Irrigation and after sowing operations

The first irrigation normally should be given one month after sowing. In very light soils, it may have to be given a little earlier. Irrigation at the time of

Sept. replace
December?

high tillering variety
irrigation facilities

which is used in a few farms to rapidly multiply improved varieties

4 -4
sowing in dry or wet soil
sowing in dry or wet soil

sowing anthesis is also very essential. Excessive irrigation should be avoided, as it promotes lodging and leads to the production of ~~red~~ mottled grains of poor quality. After the seed has been sown, very little is done in the way of hoeing and cultivation especially when the wheat is sown under dry farming conditions. One hoeing after 1½-2 months of the sowing of crop is very beneficial.

This is for fast the
critical period
& affects seed
development.

Although it is essential
to keep the fields free
of weeds.

In weed infested
fields every weeding
enhances the yield
by about 2% of
grain per acre.

Common weeds found
in wheat fields are
bholi (*C. oxycanthus*),
Bathua (*Chenopodium*),
morning glory (*Convolvulus arvensis*)
and Pearl (*Asphodelus tenuifolius*).

When the crop
is sown after maize (*Sorghum durra* staff)
(*Pennisetum glaberrimum*)
before for maize 40 lbs
or dose is essential.

Manuring

Wheat, in India, responds to fertilizers and manures, especially ~~no~~ nitrogenous ones, very well, particularly under irrigated conditions. Nitrogen can be applied to it in any form. Ammonium sulphate has proved very useful as a fertilizer. In black soil tracts under irrigated conditions ³⁰ 15 lbs. of nitrogen and under unirrigated conditions ¹⁵ 8 lbs. of nitrogen is ^{just adequate} enough; in the Indo-gangetic alluvium the dose, is 20-30 lbs. ^{applied after a fallow} Drilling of

^{or drilled} fertilizer gives better results than broadcasting. Addition of phosphates also enhances yield considerably and its application to wheat in ~~Madhya Pradesh~~ ^{the} Panjab, Bihar, ^{Bihar, Rajasthan, Delhi} Madhya Pradesh, Madhya Pradesh, and Uttar Pradesh, etc. ^{has proved quite} is specially useful. A ratio of 1:1 or ^{2:1} 1:2 of nitrogen and phosphate ^{depend on water which was received by a fallow or a crop} is optimum. Combination of organic manures is very effective in giving the maximum yield and main-

depending upon
fallow or
the crop,

-taining the soil productivity. Oil-cakes, wherever available are good organic manures but the non-edible ones should be preferred as the others are required for feeding cattle. Green manuring under ~~irrigated~~ conditions of irrigation or assured rainfall is highly beneficial to the wheat crop; addition of superphosphate along with green manure gives marked increase in the yield specially where soils are deficient in phosphate. Guar, dhaincha, and sunn-hemp can be used as green manure crops. ^{For dry} ^{tracts} ^{guar} is preferred otherwise ^{sunn hemp} is better of the two.

Harvesting

Wheat is harvested when it is dead ripe. At this stage, the straw becomes golden yellow and brittle and the grains hard. The time of harvesting is different in the

and profitable for

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is

various wheat growing areas depending upon the temperature.

State-wise these are as follows :-

	Bihar	March-April	
	Bombay	March	
<i>Madhya Bharat</i>	Madhya Pradesh	February-March	<i>March April</i>
	Panjab	April-May	
	Uttar Pradesh	March-May	<i>April</i>
	<i>Rajasthan</i>	<i>March-April</i>	
	<i>Bihar</i>	<i>April-May</i>	

In the mountains harvesting may extend even ~~wixx~~ into June or early July.

After threshing and winnowings, the grains should be thoroughly graded and dried before storing. Store rooms should be thoroughly dry and capable of remaining so during ^{the} monsoons. *They should preferably be heated & fumigated to save the produce from infestation by stored grain pests.*

Selection of varieties

Selection of a proper variety for a particular area to suit its various requirements is very important for obtaining good yields and the maximum profit. The variety selected, as far as possible, should be resistant to the diseases prevalent. In the areas of short duration, early varieties should be grown and while in the areas of long duration, varieties with the prolonged maturity should be sown. Seeds selected for sowing should be free from seed borne diseases, seeds of weeds, other varieties and broken seeds. Seeds besides being well-filled should also have high germination percentage. The varieties recommended for different States are given in the following table :-

resistance?
resistance?
resistance?
resistance?

State	Varieties recommended
Uttar Pradesh	N.P.710, Kanpur 13 (for plains), C591? N.P.770 and N.P.809 (for hills only) conditions
Panjab	C.591 (for timely sowing irrigated / C.228 (for late sowings " " C.250 (for humid areas) " C.281 (for areas with short growing period) 9D (for 'barani' areas) C.253 (for hilly tracts) and C.285 (for Lahaul valley)
Bihar	
Bihar	<i>N.P.52</i> , N.P.758 and B.R.319
Orissa	N.P.737, N.P.761, and N.P.718
Madhya Pradesh	N.P.710, Hyb.5, Hy.18, Hy.11, Hy.25, and Hy.5.
Madhya Bharat	N.P.710 and N.P.718

Karnal)
Rohtak) N0718
Gurgaon)

NP 52

Vindhya Pradesh -
West Bengal
Hyderabad

Variety	States for which recommended.	Where evolved.	Special merits
NP 710	Uttar Pradesh, Madhya Pradesh, Madhya Bharat, Vindhya Pradesh, Hyderabad, West Bengal, Saurashtra & Gujerat, south Bihar.	Indian Agric Research Institute Madhya Pradesh	Tolerant to rusts & highly resistant to loose smut. Good grain quality
NP 715	Saurashtra, parts of Bombay state	- Do -	- Do -
NP 718.	Delhi, Rajasthan, parts of Punjab, & Orissa	- Do -	Tolerant to rusts & highly resistant to loose smut. Early maturing & strong strawed; good grain quality.
NP 737	Orissa.	- Do -	Tolerant to black rust & resistant to brown rust.
NP 758	Rajasthan, North Bihar	- Do -	Tolerant to rusts & highly resistant to loose smut.
NP 761	North Bihar, Orissa	- Do -	Tolerant to black rust, partially resistant to yellow rust & highly resistant to loose smut. Very early in maturity.
NP 770.	Himachal Pradesh & hills of Uttar Pradesh & Punjab.	- Do -	Tolerant to black rust & resistant to yellow rust & loose smut. Particularly suitable for higher altitudes.
NP 809.	Himachal Pradesh & hills of Uttar Pradesh & Punjab.	- Do -	Resistant to the three rusts in the adult stages. Very robust in growth.
Ridley.	- Do -	Australian wheat introduced into India by the I. A. R. I.	Resistant to black rust. Short stiff straw. Particularly suitable for medium altitudes.
NP 52	Bihar, West Bengal, Madhya Pradesh.	Indian Agric Research Institute	Tolerant to rusts. An older variety being replaced by NP 710, NP 718, NP 761, etc.
NP 125	Parts of Uttar Pradesh	- Do -	Stiff straw & high yielding. Now being replaced by N.P. 710.
C 591	Punjab, Western Uttar Pradesh.	Punjab Dept. of Agriculture.	A high quality wheat. Particularly suited for timely sowings under irrigated conditions

Variety	States for which recommended -	Where evolved	Special merits
C 228	Punjab.	Punjab Dept of Agriculture	Very good grain quality. Suitable for late sowings under irrigated conditions
C 250	Punjab	- Do -	Resistant to yellow rust. Suitable for humid areas
9D	- Do -	- Do -	Suitable for karami conditions
C 281	- Do -	- Do -	Early maturing. Suitable for areas with short wheat season.
C 259.	- Do -	- Do -	A beardless wheat, resistant to yellow rust. Suitable for medium altitudes of Kangra Valley.
C 285.	- Do -	- Do -	Resistant to black rust. Suitable for Lahaul Valley.
Kenphad wheats: Yellow - 25 Yellow - 28 Red - 34	Bombay.	Bombay Dept of Agriculture.	Resistant to black rust (but susceptible to Alternaria).
Niphad - 4	- Do -	- Do -	Good grain quality. Being replaced by Kenphad wheats
Jay Vijay	- Do -	- Do -	Durum wheats suitable for dry areas.
Hybrid 65	Madhya Pradesh	Madhya Pradesh Dept of Agriculture	Resistant to black rust.
Hybrid 11	- Do -	- Do -	- Do -
K. 13.	Uttar Pradesh.	U.P. Dept of Agriculture.	Being replaced by NP 710, etc.
B.R. 319.	Bihar.	Bihar Dept of Agriculture.	Early maturing.

Standards

No well-recognised standards of wheat are known in India. The merchants usually judge the quality of grain by the extent of purity of the seed & by its general appearance. In regional markets, however, several trade names are in use to denote the quality of wheat. Some of the trade names commonly used are listed in the following table:

Species	Trade names	General characters	States in which the trade name is in vogue
<u>T. vulgare</u>	<u>Sharbati</u>	Hard to semi-hard grains of amber colour & small to medium size.	Punjab, Uttar Pradesh & Bihar.
	<u>Dara</u>	Mixture of white & red grains.	Punjab, Uttar Pradesh.
	<u>Pissi</u> <u>Dudhia</u> or <u>Dudhwa</u>	Soft, white grains	Bombay, Madhya Pradesh, Madhya Bharat, Bihar & Bengal.
	<u>Lal Kanak</u>	Hard or semi-hard red grains.	Punjab.
	<u>Desi Lal</u> <u>Lal Pissi</u> <u>Wajia</u> or <u>Bajia</u>	Soft, red grain.	Uttar Pradesh, Madhya Pradesh & Madhya Bharat, Rajasthan Bombay.
	<u>T. durum</u>	<u>Bansi</u> or <u>Bakshi</u> <u>Jalalia</u> <u>Malwi</u> <u>Piwla</u> or <u>Pwla</u>	White or amber grain
<u>Kathia</u> or <u>Katha</u> <u>Bijapur</u> or <u>Komp</u> <u>Jodi</u>		Red grain.	Madhya Pradesh, Madhya Bharat, U.P & Rajasthan Bombay.
<u>Khapli</u>		Hard, long, slender, reddish grain	Bombay, Parts of Madras (chiefly Nilgiris).