Wheat Crop Details for Exam

Wheat is a grass that is widely grown for its seed, a cereal grain that is a common diet all over the world. The genus Triticum is made up of numerous kinds of wheat. Around 9600 BCE, according to the archaeological record, wheat cultivation began in the Fertile Crescent. The wheat kernel is a kind of fruit known as a caryopsis in botany. More land is used to grow wheat than any other type of food crop. More wheat is traded globally than all other crops combined. The global production of wheat and other grain crops has tripled since 1960, and it is predicted to continue to increase through the middle of the twenty-first century. The distinctive viscoelastic and sticky properties of gluten proteins, which make it easier to produce processed foodstuffs, are driving up demand for wheat globally. This is because processed foods are becoming more and more popular as a result of global industrialization and the westernisation of the diet.

The topic has a chance of being asked as a UPSC Prelims Geography Question or as a Current Affairs Question.

About Wheat

A significant source of carbohydrates is wheat. With a protein level of roughly 13 percent, which is reasonably high compared to other major cereals but fairly low in protein quality for delivering necessary amino acids, it is the number one source of vegetable protein in human food globally. Wheat is a source of numerous minerals and dietary fibre when consumed whole.

History of Wheat

With discoveries going back as early as 9600 BCE, archaeological study of wild emmer suggests that it was first farmed in the southern Levant. In the Columbian exchange, wheat continued to travel from Asia to Europe and then to the Americas. The use of wheat straw (thatch) as a roofing material in the British Isles dates back to the Bronze Age and persisted till the late 19th century. Farmers favoured mutant varieties of wheat, therefore they repeatedly harvested and sowed the grains of wild grasses, resulting in the development of domestic strains.

Wheat Climate Requirements

The wheat crop is highly adaptable. It can be grown beyond even the 60-degree north altitude, as well as in temperate and frigid regions of the far north. It can also be cultivated in tropical and subtropical zones. Wheat is able to withstand extreme cold and snowfall and begin growing once springtime warm weather arrives. From the shore to 3300 metres above sea level, it can be grown. The best wheat is grown in regions that benefit from cool, damp conditions for the majority of the growing season, succeeded by dry, warm conditions to allow the grain to ripen. Although the seeds can sprout in the temperature range of 3.5 to 35 degrees Celsius, the best temperature range for wheat seed germination is 20 to 25 degrees Celsius. Rains immediately following sowing hinder germination and promote seedling blight. Wheat is not suitable for growing in warm, humid climates.
Wheat is sensitive to drought, extreme heat, and low temperatures during the heading and flowering periods. Rust attack is encouraged by cloudy, damp, and cold conditions. At the time of ripening, the wheat plant needs an optimal average temperature of 14–15 degrees Celsius. When it comes to yield, the temperature conditions at the time of grain filling and development are extremely important. Grain weight tends to decrease throughout this time period at temperatures exceeding 25 degrees Celsius.

When temperatures are high, plants lose an excessive amount of energy during the process of transpiration, and the decreased remaining energy causes worse grain production and lower yields. In India, wheat is primarily a rabi (winter) season crop.

Wheat Soil Requirements

In India, wheat is farmed on a range of soils. Wheat cultivation is best suited to soils with a clay loam or loam texture, good structure, and a moderate water holding ability. Avoiding very porous and overly drained oils should be taken into consideration. The reaction of the soil should be neutral. Wheat may be grown in dry weather on heavy soil with sufficient drainage. These soils have good rainwater absorption and retention. Wheat is vulnerable to water logging, hence heavy soils with poor structure and drainage are not recommended. Wheat can be cultivated successfully on lighter soils if the soils' ability to hold water and nutrients is increased.

Wheat Farming Techniques

The adoption of appropriate crop management practices, such as fertilisation, irrigation, weed control, crop geometry, and crop residue management in wheat-based crop sequences in different wheat growing zones, has significantly contributed to maximising the yield potential of new varieties. This is in addition to varietal improvement. The zero-tillage technique has been refined for wheat farming to lower production costs without sacrificing yield. Furrow irrigated raised beds (FIRBs) and rotary-tillage are two more resource conservation technologies (RCTs) that are also gaining popularity. The rotary tillage system has higher yields than both zero and conventional tillage while saving roughly 80% of the diesel used in the process. Recently, new equipment (Turbo seeder and Rotary disc drill) has been developed to seed into crop residues that have been retained on the surface instead of being burned, which would cause environmental pollution and the loss of vital plant nutrients.

Wheat Physiology

Leaves come out telescopically from the shoot apical meristem till the transition to reproduction, i.e. flowering. The flag leaf is the final leaf that a wheat plant produces. It is thicker and photosynthesizes more quickly than other leaves in order to provide the developing ear with carbohydrates. The majority of the grain's carbohydrates are supplied by the flag leaf, along with the second and third highest leaves on the plant, and the health of these leaves is crucial to yield development. With roots that can reach a depth of two metres, wheat is one of the crops with the deepest roots. A wheat plant builds up an energy reserve in its stem as its roots expand, which aids the plant in producing under the duress of drought and disease.

Wheat Crop Development

Typically, wheat requires 110 to 130 days between planting and harvest, depending on the environment, the type of seed, and the soil conditions. The farmer must have a thorough awareness of each stage of growth in the developing plants in order to manage crops in the best possible way. In particular, only certain stages of plant development normally need the application of fertilisers, herbicides, fungicides, and growth regulators. For instance, it is currently advised that the second dose of nitrogen be applied at the time the ear—which is not yet visible—is around 1 cm in size. Understanding phases is essential for spotting climate-related risky times. For instance, the stages between anthesis and maturity and pollen generation from the mother cell are sensitive to high temperatures, and this unfavourable effect is exacerbated by water stress. In order to ensure a satisfactory yield, farmers need to protect the "flag leaf," or last leaf, from disease and insect attacks. This leaf is responsible for around 75% of the photosynthetic reactions that occur during the grain filling

stage. There are a number of methods for determining crop stages, with the Feekes and Zadoks scales being the most used. Each scale is a standardised method that describes the various phases the crop progresses through throughout the growing season.

Wheat Crop Diseases

Numerous diseases affect wheat, most of which are brought on by bacteria, viruses, and fungus. Disease prevention requires both good crop management methods and plant breeding to create new, disease-resistant types. Fungicides, which are used to stop substantial crop losses brought on by a fungus, can be a considerable variable expense in the production of wheat. Wheat is infected by a broad variety of organisms, the two most significant of which are fungus and viruses.

Seed-borne Diseases

These include loose smut, stinking smut, common bunt, and seed-borne stagonospora (formerly known as septoria). Fungicides are used to treat these.

Leaf- and Head-blight Diseases

Leaf rust, Fusarium head scab, Stagonospora (Septoria) nodorum leaf and glume blotch, Septoria tritici leaf blotch, and powdery mildew are some of the plant diseases.

Crown and Root Rot Diseases

The two most significant of these are Cephalosporium stripe and "take-all." These two diseases are transmitted via soil.

Stem Rust Diseases

Caused by fungi known as basidiomycete, such as Ug99.

Viral Diseases

The two most prevalent viral diseases are barley yellow dwarf and wheat spindle streak mosaic (yellow mosaic). The use of resistant cultivars can be used to maintain control.

Wheat Water Efficiency

As a result of water transpiration, stomata (or leaf pores) is also involved in the intake of carbon dioxide gas from the atmosphere. Using carbon isotope-based techniques, basic physiological research into these gas exchange processes has produced useful techniques for breeding wheat types with increased water-use efficiency. These types can increase crop output in dry-land wheat fields that are rain-fed.

Wheat Economy

China, India, and Russia together produced 761 million tonnes of wheat in 2020, accounting for 38% of the global total. As of 2019, the top importers were Indonesia (11 million tonnes), Egypt (10.4 million tonnes), and Turkey (10.0 million tonnes), while the top exporters were Russia (32 million tonnes), the United States (27 million tonnes), Canada (23 million tonnes), and France (20 million tonnes).

Top 10 Wheat Producing Countries

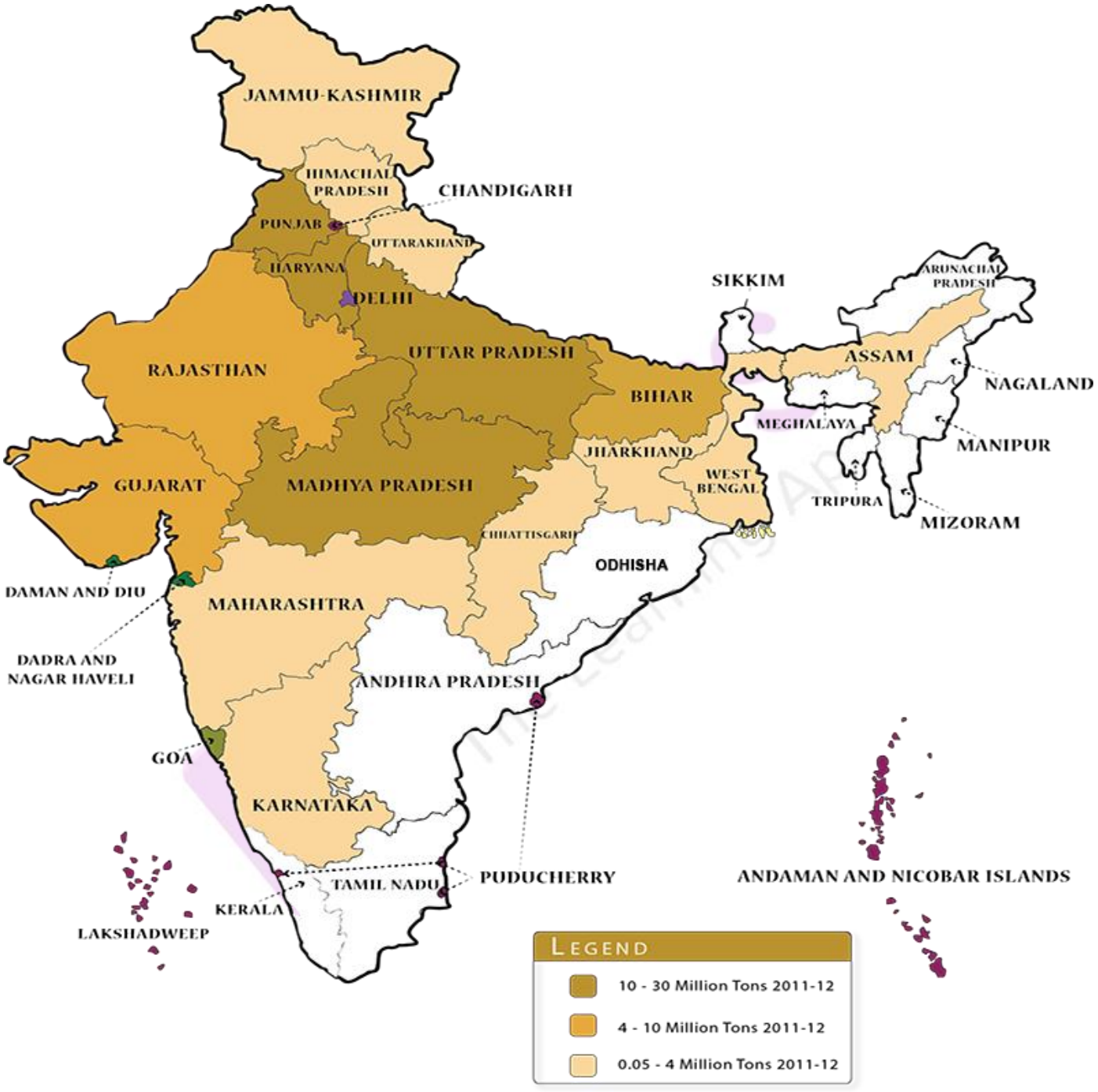
- China
- India
- Russia
- United States of America
- Canada
- France
- Pakistan
- Ukraine
- Germany
- Turkey

Top Wheat Producing States in India

While Uttar Pradesh has historically been the largest wheat producing state in India, other states are catching up.

- Uttar Pradesh
- Punjab
- Haryana
- Madhya Pradesh
- Rajasthan
- Bihar
- Gujarat
- Maharashtra
- Uttarakhand
- West Bengal

Major Wheat Producing States in India



Indian Wheat Growing Zones

Zone Name	States or Regions Covered	Approximate Area (million ha)

Northern Hill Zone(NHZ)	Hilly areas of Jammu & Kashmir (except Jammu, Kathua and Samba districts), Himachal Pradesh (except Una and Paonta valley), Uttarakhand (excluding Tarai region) and Sikkim	0.8
North Western Plains Zone(NWPZ)	Punjab, Haryana, Western Uttar Pradesh (except Jhansi Division), Rajasthan (excluding Kota and Udaipur division), Delhi, Tarai region of Uttarakhand, Una and Paonta valley of Himachal Pradesh, Jammu, Samba and Kathua districts of J&K and Chandigarh.	11.55
North Eastern Plains Zone(NEPZ)	Eastern Uttar Pradesh (28 districts), Bihar, Jharkhand, West Bengal, Assam, Odisha and other NE states (except Sikkim)	10.5
Central Zone	MP, Gujarat, Chattisgarh, Kota and Udaipur Division of Rajasthan and Jhansi Division of Uttar Pradesh.	5.2
Peninsular Zone	Maharashtra, Tamil Nadu (except Nilgiris and Palani Hills), Karnataka and Andhra Pradesh	1.6
Southern Hill Zone(SHZ)	Nilgiris and Palani Hills of Tamil Nadu	0.1

Wheat as a Food

Hard durum wheat alone can be used to grind raw wheat into semolina or flour. Raw wheat can also be crushed or sliced into cracked wheat, parboiled (or steam-cooked), dried, crushed, and de-branched into bulgur, also known as groats. Its outer husk can be used in a variety of ways if the raw wheat is divided into pieces at the mill, as is typically done. Gluten is useful for adding viscoelastic functional properties to dough during the production of wheat products, allowing for the creation of a variety of processed foods including bread, noodles, and pasta that promote wheat consumption.

Wheat Nutritional Information

Nutritional value per 100 g	Quantity	Percentage of Daily value
Energy	1,368 kJ (327 kcal)	
Carbohydrates	71.18 g	

	Sugars	0.41 g	
	Fiber	12.2 g	
Fat		1.54 g	
Protein		12.61 g	
Vitamins	Thiamine (B1)	0.383 mg	33 %
	Riboflavin (B2)	0.115 mg	10 %
	Niacin (B3)	5.464 mg	36 %
	Pantothenic acid (B5)	0.954 mg	19 %
	Vitamin B6	0.3 mg	23 %
	Folic acid (B9)	38 µg	10 %
	Choline	31.2 mg	6 %
	Vitamin E	1.01 mg	7 %
	Vitamin K	1.9 µg	2 %
Minerals	Calcium	29 mg	3 %
	Iron	3.19 mg	25 %
	Magnesium	126 mg	35 %
	Manganese	3.985 mg	190 %
	Phosphorus	288 mg	41 %
	Potassium	363 mg	8 %

	Sodium	2 mg	0 %
	Zinc	2.65 mg	28 %
	Selenium	70.7 µg	

Wheat Health Effects

Wheat is a major food for human nutrition and is consumed by billions of people globally, especially in the least developed nations where wheat products are staple foods. In many daily portions containing a variety of foods that satisfy the criteria for whole grain-rich foods, wheat is a healthy food source of numerous nutrients and dietary fibre suggested for children and adults when consumed as the whole grain. Additionally, dietary fibre may make people feel satiated, which can support a healthy weight. Additionally, wheat is a significant source of dietary fibre, protein, and minerals that are added as natural and biofortified supplements. The European Food Safety Authority (EFSA)'s opinion on health claims for gut health/bowel function, weight management, blood sugar/insulin levels, blood cholesterol, satiety, glycemic index, digestive function, and cardiovascular health is that "the food constituent, whole grain, is not sufficiently characterised in relation to the claimed health effects" and "that a cause and effect relationship cannot be established between the two".