

Recommended variety of climatic zone wise wheat

1. District of Bhawar and Low Land(Tarai) Area

Shaharanpur, Muzzaffarnagar, Bijnore, Moradabad, Rampur, Bareilly, Shahjahanpur, Pilibhit, Lakhimpur khiri, Behraich and Northern part of Behraich

Sowing Time	A. Second forth night of October
Non Irrigated Condition	H.U.W-533, K.8027, K.9351, H.D-2888
Sowing Time	A. First fortnight of November (For Bhawar Land)
Non Irrigated Condition	K.8027, K.8962, K.9465, K.9351
Irrigated Condition	U.P-2338, W.H-542, P.B.W-343, U.P-2382, H.D-2687, K-9107, PBW-590, K-9006, DBW-17, PBW-550, K-307 (Shatabdi)
Sowing Time	C. Sowing is delayed till 25th December
Irrigated Condition	Raj- 3765, P.B.W-373, K-9162, U.P-2425, Naina N.W-1076, Naina (K-9533), D.B.W-14, D.B.W-16, K-9423, P.B.W-590.

2. District of Western Plains Area

Shaharanpur, Muzzaffarnagar, Meerut, Baghpat, Ghaziabad, Gautam BudhNagar, Bulandshahar.

Sowing Time	A. Second forth night of October to First fort night of November.
Non Irrigated Condition	K-8027 (Maghar), H.U.W.S-533,
Sowing Time	B. Second forth night of November
Non Irrigated Condition	P.B.W- 175, K.8027, K.-8962, K.-9465, K.-9351, W.H.- 147
Irrigated Condition	U.P-2338, W.H-542, P.B.W-343, U.P-2382, H.D-2687, K.-9107, P.B.W-502, K.-9006, D.B.W-17, P.B.W-550, K.-307 (Shatabdi), H.D-2967
Sowing Time	C. Sowing is delayed till 25th December
Irrigated Condition	Raj- 3765, U.P- 2338, P.B.W-373, K-8020, U.P-2425, N.W-1076, K-9423, K.- 7903, Naina(K-9533), D.B.W-16

3. District of Mid-Western Plains Area

Bijnore, Jyotiba Phule Nagar, Moradabad, Rampur, Bareilly, Badaun, Pilibhit.

Sowing Time: Non -irrigated condition, Irrigated condition-as per western plain.

4. District of South Western Semi Arid Areas

Aligarh, Hathras, Mathura, Agra, Firozabad, Mainpuri, Etah.

Sowing Time	A. Second forth night of October
Non Irrigated Condition	K-8027, H.U.W-533,K-9351
Sowing Time	B. First fortnight of November
Non Irrigated Condition	K.-8027, K.-8962, K.-9465, K.-9351, K.-9644
Sowing Time	C. Sowing is done timely by 25th November
Irrigated Condition	P.B.W-343, U.P-2338, K.-9006,K.-9107,K.-307,H.D-2687,U.P-2382,P.D.W-233, P.D.W-215, W.H-896, H.I-8381, P.B.W-502
Sowing Time	D. Sowing is delayed till 25th December.
	Malviya-234, U.P-2338, Raj-3077, Raj-3765, PB.W-373, U.P-2425, K.-9162, K.-7903, K.-9533, N.W-1076, D.B.W-16.
For Ushar Areas	K.R.L 1-4, K.-8434, K.R.L-19, N.W-1067, K.R.L-210, K.R.L-213, K.-8434

5. District of Mid Plains Areas

Shahjahanpur, Farrukhabad, Kannauj, Etawah, Auraiya, Kanpur Nagar, Kanpur dehat, Fatehpur, Kaushambi , Allahabad, Lucknow, Unnao, Rai bareilly, Sitapur, Khiri, Hardoi.

Sowing Time	A. Second forth night of October to First fort night of November.
Non Irrigated Condition	K-8962, K.-9465, Malviya-533, K.- 9351,H.D-2888.
Sowing Time	B. First week of November till 25th November
Irrigated Condition (timely)	P.B.W-343, U.P-2338, W.H-542, K.-9107, K.-9006, H.P-1731, N.W-1012, U.P-2382, H.U.W-468, P.B.W-443, H.D-2733, H.D-2888, K.-307 (Shatabdi)
Sowing Time	C. Sowing is delayed till 25th December.
Irrigated Condition	Malviya-234, K.-7903, U.P-2338, K.-9162, K.-9533, H.D-2643, H.P-1744, N.W-1014, U.P-2425, N.W-2036, D.B.W-14, P.B.W-524, N.W-1076, H.U.W-510, K.-9423
For the trenching land	D. Second forth night of November
	K.- 8962, K.-9465, H.D.R-77, K.-9351
For Ushar areas (Irrigated condition and timely sowing)	K.R.L 1-4,K.R.L-19,K.- 8434 N.W-1067, K.R.L-210 and K.R.L-213

6. District of Bundelkhand areas

Jhansi, Jalaun, Hamirpur, Mahoba, Lalitpur, Banda, Chitrakoot.

Sowing Time	A. Second forth night of October
Non Irrigated Condition	C.-306, Sujata K.-8962, K.-9465, K.-9351, H.W-2004, Arnej (9-30-1), Lok-1 H.D-2888
Sowing Time	B. Timely sowing (1st November to 25th November)
Irrigated Condition	D.L -803-3, Raj-1555, H.I-8381, H.I-8498, K.- 9107, U.P-2338, W.H -147, G.W -322, P.B.W -343, H.D -2733
Sowing Time	C. Sowing is Delayed (till 25th December) H.I -784, Malviya -234, H.P -1633, D.L -788-2, U.P -2425, K.- 9162, K.-9533, G.W -173, K.- 7903, K.- 9423, H.U.W-510

7. District of North Eastern Plain Areas

Bahraich, Shrawasti, Balrampur, Gonda, Siddharthnagar, Basti, Sant Kabir Nagar, Mahrajgunj, Gorakhpur, Khushinagar, Deoria.

Sowing Time	A. Second forth night of October to First fort night of November.
Non Irrigated Condition	K.- 8962, K.-9465, K.-9351, H.D.R -77, H.U.W -533, H.D -2888
Sowing Time	B. Timely sowing (first fort night of November to Second forth night of November)
Irrigated Condition	K.- 9107, H.P-1731, K.-9006, N.W-1012, U.P-2382, H.P -1761, HUW-468, HD-2733, HD-2824, PBW-343, PVW-443, UP-2338, K-0307, PBW-502, CBW-38, Raj-4120, DBW-39, NW-5054
Sowing Time	C. Delayed sowing till 25th December
Irrigated Condition	DBW-14, malviya-234, HP-1633, HP-1744, NW-1014, NW-2036, HD-2643, UP-2425, K-9162, PBW-373, NW-1076, HW-2045, K-9423, K-7903, PBW-524, HI-1563, NW-5054
Ushar Land Irrigated Condition	KRL-1-4, KRL-19, Raj-3077, Lok-1, K-8434, NW-1076 NW-1067, KRL-210 & 213.

8. Eastern Plain District

Barabanki, Faizabad, Sultanpur, Pratapgarh, Jaunpur, Ambedkar Nagar, Azamgarh, Sant Ravidas Nagar, Varanasi, Chandauli, Gazipur, Mau, Balia

Sowing time, Irrigated and non irrigated condition- as per district of north eastern plain area .

9. Vindhya Zone Area

Allahabad, Mirzapur, Sonbhadra.

Sowing Time	A. First fortnight of November
Non-Irrigated Condition	K-8962, K-9351, K-9465, HUF-533, HD-2888.

Sowing Time B. Whole November

Irrigated Condition UP-2338, WH-542, K-9006, HP-1731, NW-1012, UP-2382, K-9107, HUW-68, PBW-343, K-307

Sowing Time C. From second fortnight of November till first fortnight of December.

Irrigated Condition UP-2338, HP-1731, Malviya-468, PBW-373, Malviya-234, HD-2643, HP-1744, NW-1014, UP-2425, K-9423, NW-2036, NW-1076, HUW-510, K-307

For Ushar Land KRL-19, Lok-1, NW-1067, NW-1076, KRL-210 and 213.

Following facts should be taken care of to get high yield of wheat:

SN	Species	Date of Notification	Productivity Q/Ha	Harvesting Period in Day	Plant Height in cm	Prevention of Diseases
1	2	3	4	5	6	7

Incomplete Condition:

1	Maghar (K-8027)	31-07-89	30-35	140-145	105-110	Kanduwa and Jhushsa Avrodhi
2	Indra (K-8962)	01-01-96	25-35	90-110	110-120	
3	Gomti (K.-9465)	15-05-98	28-35	90-110	90-100	
4	K.-9644	2000	35-40	105-110	95-110	
5	Mandakani (K.-9351)	2004	30-35	115-120	95-110	
6	H.D.R.-77	15-05-90	25-35	105-115	90-95	
7	H.D.-2888	2005	30-35	120-125	100-110	Ratua Avrodhi

Irrigated condition (for sowing from time to time)

8	Dewa (K-9107)	01-01-96	45-50	130-135	105-110	Ratua Jhushsa and karnal bunt ke liye Avrodhi
9	K.-0307	06-02-07	55-60	125-100	85-95	
10	H.P.-1731 (Rajalakshmi)	04-05-95	55-60	130-140	85-96	--Surplus--
11	Narendra Wheat -1012	15-05-98	50-55	135-140	85-95	--Surplus--
12	Ujiyar (K.-9006)	15-05-98	50-55	130-135	105-110	
13	H.U.W.-468	09-06-99	55-60	130-140	85-95	
14	D.L.-784-3 (Vaishali)	17-08-93	45-50	130-135	85-90	

15	U.P.-2382	06-04-99	60-65	135-140	95-100	
16	H.P.-1761	09-09-97	45-50	135-140	90-95	
17	D.B.W.-17	2007	60-65	125-135	95-100	Ratua Avrodhi
18	H.U.W.-510	1998	50-55	115-120	-	
19	P.B.W.-443	2000	50-55	125-135	90-95	
20	P.B.W.-343	1997	60-65	125-140	90-95	
21	H.D.-2824	2003	55-60	125-135	90-100	
22	C.B. W.-38	2008	57-60	112-129	80-105	
23	K.-1006	2014	55-60	120-125	88-90	Ratua, Jhushsa Avrodhi
24	K.-607	2014	55-60	120-125	85-88	
25	K.402	2013	55-60	120-125	85-88	Ratua, Jhushsa Avrodhi
26	D.B.W.-39	2009	55-60	121-125	80-105	Ratua, Jhushsa Avrodhi
27	H.D. 2967	2012	55-60	122-125	90-95	-
	P.D.W.-502 Irrigated					
28	Condition (Sowing of delay)	2004	45-60	126-134	80-90	-
29	D.B.W.-14	2002	40-45	108-128	70-95	
30	H.U.W.-234	14-05-88	35-45	110-120	85-90	
31	H.I.-1563	2010	40-45	110-115	85-90	Ratua Avrodhi
32	Sanoli H. P.-1633	04-11-92	35-40	115-120	115-120	
33	H.D.-2643 (Ganga)	19-06-97	35-45	120-130	85-95	
34	K.-9162	2005	40-45	110-115	90-95	
35	K.-9533	2005	40-45	105-110	85-90	
36	H.P.-1744	09-09-97	35-45	120-130	85-95	
37	Narendra Wheat -1014	15-05-98	35-45	110-115	85-100	Ratua, Jhushsa Avrodhi
38	K.-9423	2005	35-45	85-100	85-90	
39	K.-7903	2001	30-40	85-100	85-90	
40	Narendra Wheat -2036	2002	40-45	110-115	80-85	Ratua Avrodhi
41	U.P.-2425	06-05-99	40-45	120-125	90-95	
42	H.W.-2045	2002	40-45	115-120	95-100	

						Ratua, Jhushsa Avrodhi
43	Narendra Wheat-1076	2002	40-45	110-115	80-90	--Surplus--
44	P.B.W.-373	1997	35-45	120-135	85-90	
45	D.B.W.-16	2006	40-45	120-125	85-90	
46	A.A.I.W.-6 for Inferior Land	2014	35-40	110-115	105-110	Leaf rust Avrodhi
47	K.R.L.-1-4	15-05-90	30-45	130-145	90-100	
48	K.R.L.-19	2000	40-45	130-145	90-100	
49	K.-8434 (Prasad)	2001	45-50	135-140	90-95	
50	N.W.-1067	25-08-2005	45-45	125-130	90-95	Ratua Avrodhi
51	K.R.L.-210	2009	35-45	112-125	65-70	Ratua Avrodhi
52	K.R.L.-213	2009	35-40	117-125	60-72	Ratua Avrodhi (Rust)

Following facts should be taken care of to get high yield of wheat:

- Use rotavator harrow for preparation of field.
- Bio-manures must be used.
- If possible, half quantity of the nutrient element should be given by bio manures.
- Selection of variety should be done on the basis of regional adaptation and time.
- Use pure and certified seed for sowing after seed treatment.
- Balanced quantity of fertilizers should be used at the right time by proper method on the basis of soil testing report.
- Irrigation at the right time in the sufficient quantity through proper method in critical phases(Crown root and flowering stage).
- Control in time in the event of gehusa menace.
- Complete all the other activities in time on the basis of recommendations.
- Change the seeds in third year.
- Use zero tillage and raised bed method.
- Pay special attention for protection from insects and diseases.

Intensive Method

In case of irrigated sowing:

Around 97% of the total wheat area is irrigated but assured irrigation is available in small area. Hence improved varieties should be selected and used after understanding how the yield of wheat can be increased by use of limited resources of irrigation and fertilizers.

Preparation of field

Mostly wheat is sown after paddy hence sowing of wheat is often delayed. We should decide in advance as to what variety of paddy should be selected in Kharif and what variety of wheat can be sown in Rabi. To get good yield of wheat planting of paddy in time is essential so that the field is vacant in the month of October. Secondly, it is also note worthy that the soil becomes hard after paddling in paddy. It will be suitable to plough twice by disc harrow to convert the soil into fine tilth after plough by rotavator. By use of disc harrow the remains of paddy is cut into small pieces. Spread 15-20kgs nitrogen (in the form of urea) per hectare at the time of first plough for preparation of field to allow the crop remains to rot. By use of tractor driven rotavator, the field is fully prepared by single plough.

Sowing

Wheat should be sown in time when there is sufficient moisture. Late ripening variety must be sown in time otherwise the yield will be reduced. As the sowing becomes delayed, rate of reduction in yield of wheat is also declined proportionately. If the wheat is sown in December, yield is reduced by 3-4 quintal per hectare and if it is sown in January, the yield is reduced at the rate of 4-5 quintal per hectare per week. By sowing wheat using seed drill, fertilizer and seed can be saved.

Seed Rate and Seed Treatment

In case of line sowing use 100kg seed in normal condition and 125kg per hectare seed if the grains are bold. In broadcasting method, 125kg normal grain and 150kg per hectare bold grain should be used. Check the germination rate before sowing. This facility is available free of cost at state research centers. If the germination capacity is low, increase the seed rate accordingly. If the certified seed is not available, seed treatment is essential. Sow the seed after treatment with carboxine, azatobactor and PSB. In the areas of limited irrigation, use 75kg normal grain and 100kg bold grain per hectare when the seed is sown by raised bed method.

Distance between rows

18-20cm in normal condition and 5cm deep.

In case of late sowing

15-18cm and 4cm deep.

Method

Sow the seeds in furrows through ferti seed drill when the moisture is sufficient in the field. Sowing after irrigation is better. It should be taken care that there must be 400-500 plants with streak otherwise the yield will be adversely affected. To avoid delay, sow Pant nagar zero till seed by fertilizer drill. Sowing by tractor driven roto till drill is more beneficial. Sow the seeds without plough in Bundelkhand (Mar and kavar soil) so that the germination is good.

Bed Planting

By this technique, the field is prepared by traditional method and bed is prepared for planting. In this method, a special machine called bed planter is used to make furrows and sowing. The furrows are also used for water drainage. On a bed, the wheat is planted in 2 or 3 rows. The farmer can save seed, fertilizer and water and take good yield in this method. The wheat crop can be sown as mixed crop with sugarcane crop. The soil for sowing should be in the form of fine tilth and there should be sufficient moisture for good germination. The characteristics features and benefits of this method are as follows:

- Approximately 25% seed can be saved in this method. It means 30-32 kg seed is sufficient for 1 acre.
- This machine prepares the bed of 70 cm on which the wheat can be planted in 2-3 rows. For better germination, seed should be placed at a depth of 4-5 cm.
- The bed should be in north-south direction so that every plant can get direct sun light.
- The cost of this machine is approximately Rs.70, 000.
- 25-40% water requirement is less in this method. If there is sufficient moisture in the field, irrigate the field within 5 day of sowing.
- In this method, approximately 25% nitrogen is saved. 120 kg Nitrogen, 60 kg Phosphorous and 40 kg potash per hectare is sufficient.

Crop diversification by Bed Planting

Crop of moong, maize, soyabean, arhar and cotton can be grown immediately after wheat. This method results 15-20% more yield of pulses and oilseeds.

Use of Fertilizers

A. Quantity

It is better to use fertilizer on the basis of soil testing report. To get good yield of dwarf variety of wheat after the crop of maize, paddy, jowar, bajra in Kharif, use at the rate of 120:60:40 kg per hectare and in case of late sowing, 80: 40:30 nitrogen, phosphorous and potash respectively. In Bundelkhand region, use of nitrogen, phosphorous and potash at the rate of 120: 60:40 kg per hectare respectively and 30 kg sulphur per hectare has been found beneficial in normal condition. In the areas where DAP is being continuously used, use of 30 kg sulphur would be beneficial. If the field was left vacant in Kharif or pulses were grown, use 20 kg less nitrogen per hectare. Use 60 quintal farm yard manure for good yield. It helps in maintaining soil fertility.

In continuous crop cycle of paddy-wheat area, the yield of wheat starts declining. Hence, use green manure between harvesting of wheat crop and planting of paddy or use 10-12 ton per hectare farm yard manure in paddy crop. Now a day, deficiency of zinc is often seen. The symptom of deficiency

of zinc appears in the plant between 20-30 days of sowing which are as follows:

- The infected plants remain dwarf in comparison to healthy plants.
- The base of the leaves turns yellow from the lower side and grows upward.
- After some time, brown spot appears on the leaves.

If the symptom of deficiency of zinc appears in standing crop, spray 5 kg zinc sulphate and 15 kg urea dissolved in 800 liter water per hectare. If the top dressing of urea is already done, spray zinc sulphate dissolved in 2.5 kg lime water in place of urea (dissolve 2.5 kg quick lime in 10 liter water in the evening and filter it in the morning and use filtered water and through away the lime). Please note that it is essential to use urea or lime water with zinc sulphate. If zinc sulphate has not been used in paddy field as basal dressing and there is possibility of deficiency, top dress with 20-25 kg zinc sulphate.

B. Time and Method

Use fertilizer in following manner in different types of soil to increase the fertilizer capacity:

- **Loam or Matyar, Kawar and Mar**

Half of the quantity of nitrogen and full quantity of phosphate and potash should be given 2-3 cm below the seeds in the furrows and remaining quantity of nitrogen should be given before 2 hours of first irrigation.

- In sandy, loam, rakad and padwa sandy clay, 1/3rd quantity of nitrogen and full quantity of phosphate and potash should be given below the seeds in the furrows. Half of the remaining quantity should be given after first irrigation⁹ after 20-25 days of sowing at crown root initiation stage) and the remaining quantity after second irrigation. In these type of soils, top dressing after irrigation is beneficial. Where only 40 kg full quantity of phosphate and potash should be given nitrogen and 2 irrigation is possible, place the whole quantity of nitrogen at the time of sowing in heavy loam soil but in case of light loam soil, place half of the quantity of nitrogen in the furrows at the time of sowing and top dress with the remaining quantity at the time of first irrigation.

Irrigation

A. In case of Assured Irrigation

1. Normal Condition: Irrigation should be done in light soil in following stages to get optimum yield from dwarf variety of wheat. Deficiency of water at these stages adversely affects the yield heavily but give light irrigation.

First Irrigation After 20-25 days of sowing (crown root initiation stage)

Second Irrigation After 40-45 days of sowing (tillering stage)

Third Irrigation After 60-65 days of sowing (jointing stage)

Fourth Irrigation After 80-85 days of sowing (flowering stage)

Fifth Irrigation After 100-105 days of sowing (milk stage)

Sixth Irrigation After 20-25 days of sowing (dough stage)

2. A. In loam or heavy loam soil, 4 times irrigation can result good yield but the irrigation should be 8 cm deep.

- First irrigation after 20-25 days of sowing.
- Second irrigation after 30 days of first irrigation.
- Third irrigation after 30 days of second irrigation.
- Fourth irrigation after 20-25 days of third irrigation.

B. In case of limited irrigation resources

If only three irrigations are possible, first irrigation should be given at crown root initiation stage, second at jointing stage and third at milk stage. If two irrigations are available, first irrigation should be given at crown root initiation stage and second at flowering stage. If only one irrigation is possible, it should be given at crown root initiation stage.

Please pay attention to following three points in irrigation of wheat:

- Level the field well before sowing and make a slope in any one direction so that the water can be uniformly distributed in the whole field.
- Divide the field in required size according to the type of soil in the field and means of irrigation after sowing. It helps in distribution of water at a time.
- In case of assured irrigation, light irrigation (approximately 6 cm deep) in light soil and in case of loam and heavy soil where irrigation facility is available, heavy irrigation (8 cm deep) should be done.

Note: In usher land, first irrigation should be done after 28-30 days and rest irrigation should be light and frequent so that the soil is not dried.

C. In case of irrigation and late sowing

Wheat is sown after aghani paddy, toria, potato, ratoon of sugarcane and early ripening variety of arhar but yield in this area can also be increased to some extent by following techniques of agriculture research:

- Select the variety according to seasonal adoptability for late variety which has already been described.
- In case of late sowing, use zero trill age machines for sowing.
- Use seed at the rate of 125 kg per hectare and fertilizer in balanced quantity (80:40:30).
- Soak the seed for 24 hours in water, allow germinating and sowing when the moisture is sufficient.
- Late sown wheat crop requires frequent irrigation as compared to normal crop. Do first irrigation after 15-20 days of germination and top dress. Then irrigate at an interval of 15-20 days. Water should be available in sufficient quantity at the time of streak formation and milk stage. Deficiency of water at this stage will adversely affect the yield. Do light irrigation. Adopt other cultivation activity like irrigated wheat.

Cultivation of wheat in non irrigated and rain fed condition

In the state, approximately 10% area of wheat is non-irrigated where yield is very low. The yield of this area reduces the average yield of the state.

Experiment reveals that cultivation of rye, barley and gram is more beneficial than wheat in rain fed conditions. In such conditions, sow wheat in October when there is sufficient moisture. But if there is sufficient rain in the month of October-November, wheat can be sown by adopting following technique:

Preparation of field and conservation of moisture

Prepare the field by conserving the water as much as possible of last monsoon rain. In non irrigated area, not much plough is required otherwise there is possibility of loss of moisture. In such area, plough in evening followed by leveling next day can conserve the moisture.

Time of Sowing

Sow at the time of sufficient moisture, the recommended variety between second fortnight of October to first fortnight of November.

Seed Rate and distance between rows

Use seed at the rate of 100 kg per hectare and sow the seed in furrows at a distance of 23 cm in such a way the soil above the seed is not more than 4-5 cm.

Quantity of fertilizer and method of its use

Use 40 kg nitrogen, 30 kg phosphate and 30 kg potash per hectare in rain fed wheat farming. The whole quantity of fertilizer should be poured in the furrows 2-3 cm below the seeds through sprinkler or ferti -drill. If it rains, use of 15-20 kg nitrogen will be beneficial. If it does not rain, make foliar spray of 2% urea.

Crop Protection Management

Important Point: Store the grains in metallic bins, mud bins or room which ever is available. Though metallic bins are best for storage. Clean the bins before storage and spray 50% solution of malathion (1:100) at the rate of 3 liter per 100 square meter.

(A) Critical Weeds

Thin Leaves	Gehusa and wild oat.
Wide Leaves	Bathua, sanji, Krishanil, Hiran khuri, Akra-akri, wild carrot, Jyaji, Khartua, Satyashi etc.

Control Measures

1. For control of gehusa and wild oat, recommended quantity of any one of the following weed herbicides chemicals dissolved in 500-600 liter water per hectare should be sprayed after 20-25 days of sowing by flat fan nozzle. For sulfuran, quantity of water should not exceed 300 liter.

- A 1.25 kg per hectare Iso proturan 75% wp
- B 33 gm sulfuran 75% wg (2.5 unit per hectare)
- C 1 liter per hectare finoxaprop-p ethyl 105 EC
- D 400 gm per hectare Clodinafop propargil 15% wp

2. For control of wide leaf weeds, bathua, sinji, Krishna nil, hiran khuri, chatrī-matrī, akra-akrī, wild carrot, gajrī, pyajī, khartua, satyanashi etc recommended quantity of any one of the following weed herbicides chemicals dissolved in 500-600 liter water per hectare should be sprayed after 25-30 days of sowing by flat fan nozzle.

- A 625 gm per hectare of 2-4 D sodium salt 80% technical
- K 1.25 liter per hectare of 2-4 D methyl amine salt 58% wsc.
- C 50 gm per hectare of carfentrajan ethyl 40%.
- D 20 gm per hectare of met sulfuran ethyl 20%.

3. For control of thin and wide leaf both types of weeds, recommended quantity of any one of the following weed herbicides chemicals dissolved in 300 liter water per hectare should be sprayed by flat fan nozzle. For metributin, quantity of water should be 500-600 liter.

- A 3.30 liter per hectare of Pendimethylene 30% EC within 3 days of sowing.
- B 33 gm (2.5 unit) per hectare of sulfofuran 75% wp after 20-25 days of sowing.
- C 250 gm per hectare of metribuzin 70% wp after 20-25 days of sowing.
- D 400 gm (2.50 unit) of sulfofuran 75% + met sulfofuran methyl 5% wg after 20-25 days of sowing.

4. For weed control in wheat crop, 1.25 ml sufectet dissolved in 500 ml water at the rate of 400 gm per hectare clodinofof 15% wp+met sulfuran 1% wp.

(B) Important Insects

Termite Termite is a social insect and lives in colony. In one colony, there is 90% worker, 2-3 army, 1 queen and a king. Worker insects are wing less and white in color with yellow tinge that damages the crop.

Weevil This insect is brown in color which lives in cracks in dry soil. This insect cuts the plant at ground level and damages them.

Mahu

Infants and adults of green color suck the juice from the streak and damage them. The insect secretes honey on which black fungus grows and hinders the photo synthesis.

Control Measures

- For control of termite, treat the seed with chlorpyrifos 20% EC or thiomethoxam 30% fs at the rate of 3 ml. per kg seed.
- Mix 2.5 kg per hectare biopesticide Beauveria bassiana 1.15% with 60-70 kg farm yard manure, sprinkle water on it and keep it 8-10 days in shade and pour in the soil before sowing at the time of last plough. This controls termite and other soil borne insects.
- Use 2.5 liter per hectare chlorpyrifos 20% EC with irrigation water for control of termite/weevils in standing crop.
- For control of Mahu insect, spray dimethoate 30% EC or methyl-o-demeton 25% EC, 1.0 liter or thiomethaxam 25% wg, 500 gm per hectare dissolved in approximately 750 liter water. Azadirachtin(neem oil) 0.15% EC can be used at the rate of 2.5 liter per hectare.

(C) Main Disease

Gerui Disease(Black, Brown and Yellow)

Gerui are black, brown or yellow in color. Black gerui affects the stem and leaf both.

Karnal Bunt

The infested grain is partially converted into black powder

Unpredictable Kandua

In the infested plant, black powder is formed in place of streak which is covered by white membrane. This white membrane ruptures afterward and numerous spores of fungus will be spread in air which infects the healthy streaks at the time of flowering.

Leaf blight disease

In earlier stage of disease, light yellow or grey colored oval shaped spots appear on lower leaves. The spot turns brown at the edges of the leaf and light grey in mid region afterwards.

Senhu Disease

This disease is caused by cut worm. The leaves of infested plant folds and shrinks. The infested plants remain dwarf and more branches come out in comparison to healthy plant. The infested streaks are small and spread and grey or black joints are formed in place of grains in which the cut worms live.

Control Measure

1. Seed Treatment

- For control of smut and karnal bunt, sow the seeds after treatment with 2.5 gm of thiram 75% ws or 2.5 gm of carbandasim 50% wp or 2.0 gm of carbaxin 75% wp or 1.0 gm of tebuconazol 2% ds prt hectare.

- For control of smut and other seed borne disease and traditional soil borne disease, sow the seeds after its treatment with carbaxin 37.5% and thiram 37.5% ds/ws at the rate of 3 gm per hectare.
- For control of gehusa disease, soak the seed in 2.0% salt solution (200 gm salt dissolved in 10 liter water). The infested seed floats up as it is lighter. Collect the infested seed and destroy it. Clean the seed soaked in salt solution with clean water 2-3 times, dry it and then use for sowing.

2. Soil Treatment

- For control of soil borne and seed borne disease, mix 2.5 kg per hectare of bio pesticide trichoderma biradi 1% wp or trichoderma hargarianum 2% wp with 60-75 kg farm yard manure, sprinkle light water on it and keep it for 8-10 days in shade. Spread it in the field at last plough before sowing. It will help in management of smut and karnal bunt.
- For control of tapeworm, spray carbofuran at the rate of 3 G 10-15 kg per hectare.

3. Foliar Treatment

- For control of gerui and leaf blight disease, spray 700 gm thiofenate methyl 70% wp or 2.0 kg Zirum 80% wp or 2.0 kg mancozeb 75% wp or 2.0 kg Zineb 75% wp per hectare dissolved in 750 liter water.
- For control of gerui, spray 500 ml per hectare propiconazole 255 EC dissolved in 750 liter water.
- For control of karnal bunt, spray 2.25 kg witer tanal 25% wp or 500 ml per hectare propiconazole 25% EC dissolved in approximately 750 liter water.

4. Rats

Field rats, Soft furred field rats and field mouse.

Control Measures

The rat damages the wheat crop. If the rats are watched and weekly control program of zinc phosphide 80% is carried out in group, it will result in success:

First Day	Watch the field, close the holes and dig wooden stick.
Second Day	Watch the field. Remove the wooden stick from the holes which are closed. Where the holes are open, leave the sticks there. In open holes, place fodder made of 1 part of mustard oil and 48 part of roasted non-poisonous grain.
Third Day	Watch the holes again and place the non-poisonous fodder again.
Fourth Day	Use poisonous feed made of 1.0 of zinc phosphide with 1.0 gm mustard oil and 48 gm roasted grains.
Fifth Day	Watch the field and burry the dead rats in the soil.

Sixth Day Close the holes again. If the holes are again open, repeat this weekly program.

Place 10 gm fodder made of bromodiolon 0.005% in every open hole. The rats die after eating this medicine 3-4 times.

Important Point-According to climate and Variety

- Timely sowing.
- Select the recommended variety and use only pure and certified, treated seeds as per specific area.
- Use fertilizer in recommended quantity on the basis of soil testing. Use the sufficient quantity of fertilizer at the time of sowing.
- Irrigate as the recommendations by maximum utilization of irrigation capacity.
- If zinc phoshide has not been used in earlier crop or at the time of sowing, use zinc sulphate as per recommendations in standing crop.
- Timely use of chemicals foe weed control as per recommendations.
- Control weeds and insects in time.

Integrated Management

- Prepare the compost of crop stubbles in earlier crops.
- If possible, dig the termite place and kill the queen termite.
- Use neem cake in termite affected area at the rate of 10 quintal per hectare.
- Always use good quality farm yard manure in termite affected area.
- Sow the seeds after treatment with the chlorpyrifos 20EC at the rate of 4 ml per kg seed in termite affected area.
- Timely sowing reduces the menace of mahu and sainik insects.
- Use fertilizers only on the basis of soil treatment. The possibility of mahu and sainik insect menace will be there, if higher quantity of nitrogenous fertilizers is used.
- Conserve natural enemies of insects.
- Use chlorpyrifos 20 EC at the rate of 2-3 liter per hectare with irrigation water or sand in case of termite menace in standing crop.
- Mix Beauvaria bassiana 2 kg with 20 kg farm yard manure, keep it for 10 days in shade and spread in the furrows at the time of sowing.

Improved methods of wheat cultivation by zero tillage in the state

In wheat-paddy crop cycle in the state, where the sowing of wheat is especially delayed, sowing of wheat by tillage has been found beneficial. In this method, the wheat is sown by a machine (Zero tillage machines) without preparation of field.

Benefits: Benefits of this method is as follows:

- Reduction in cost of production of wheat (Approximately Rs.2000/ per hectare).
- If the wheat is sown earlier by 7-10 days, yield increases.
- Results in sufficient numbers of plants and best use o fertilizer.

- As the water is not logged in first irrigation, there is no problem in growth of the crop.
- Reduce the menace of gehusa, the critical wheat crop weed.
- In lower land, on the bank of canal and brick fields, wheat can be sown easily by use of this machine.

Method: Attention must be paid to following facts at the time of sowing by Zero Tillage Method:

- There should be sufficient moisture in the field at the time of sowing. If necessary, irrigate at least 1 week before the harvesting of paddy. Sow wheat immediately after harvesting of paddy.
- Appropriate seed rate will be 125 kg per hectare.
- Use granular fertilizer(NPK) .
- First irrigation after 15 days of sowing..
- Use herbicides chemicals for weed control.
- Land should be leveled.

Note: Do not burn the crop stubbles after wheat harvesting.