

F.No. 19-11/2015-DWD
Government of India
Ministry of Agriculture and Farmers Welfare
Department of Agriculture, Cooperation and Farmers Welfare
Directorate of Wheat Development Ghaziabad

Dated: 04.11.2015

To,

The Director of Agriculture,

Government of Assam, Bihar, Chhattisgarh, Gujarat, Haryana, Himachal Pradesh, Jharkhand, Jammu & Kashmir, Karnataka, Madhya Pradesh, Maharashtra, Punjab, Rajasthan, Uttar Pradesh, Uttarakhand and West Bengal

Sub: Zone-wise Advisory for Wheat sowing in different production conditions – reg.

Sir,

Please find enclosed herewith a copy of Zone-wise Advisory for Wheat sowing in different production conditions furnished by Indian Institute of Wheat and Barley Research, Karnal. A meeting on evolving strategies for enhancing wheat production with special reference to management of yellow rust and karnal bunt was held on 29.10.2015 at IIW&BR, Karnal under the chairmanship of Additional Secretary, DA,C&FW GOI, Ministry of Agriculture & Farmers Welfare.

In this meeting it was decided that above mentioned advisory may be shared with States Department of Agriculture. In this regard, It is also stated that the Directorate of Wheat Development, Ghaziabad, UP has already circulated above mentioned advisory to your state vide letter F. No. 19-11/2015-DWD/872-888 dated 23rd October, 2015.

It is, therefore, requested to kindly ensure the adoption of above mentioned advisory in the farmer's field in your state for enhancing the production of Wheat.

Yours faithfully,

-Sd-
(Narender Kumar)
Director

Agro-climatic Zones of Wheat in India

Sl. No.	Zones	States/regions covered	Approx Area during 2013-14
1	Northern Hill Zone (NHZ)	Hilly areas of J&K(except Jammu, Kathua and Samba districts), Himachal Pradesh (except Una & Paonta valley), Uttarakhand (excluding Tarai region) & Sikkim	0.8
2	North Western Plains Zone (NWPZ)	Punjab, Haryana, Western UP (except Jhansi Div), Rajasthan (excluding Kota & Udaipur div), Delhi, Tarai region of Uttarakhand, Una & Paonta valley of HP, Jammu, Samba & Kathua districts of J&K and	11.5
3	North Eastern Plains Zone (NEPZ)	Eastern UP(28 dist), Bihar, Jharkhand, West Bengal, Assam, Odisha and other NE states (except Sikkim)	11.1
4	Central Zone	MP, Gujarat, Chhattisgarh, Kota & Udaipur Div of Rajasthan & Jhansi Div of UP.	6.08
5	Peninsular Zone	Maharashtra, Tamil Nadu (except Nilgiris & Palani Hills), Karnataka & Andhra Pradesh	1.6
6	Southern Hill Zone (SHZ)	Nilgiris & Palani Hills of Tamil Nadu	0.1
		Total	31.18

Indian Institute of Wheat & Barley Research, Karnal

(Advisory for Wheat Sowing in different production conditions)

Wheat growers are advised to keep track of the latest technologies on wheat and adopt these to enhance wheat productivity, and reduce cost of production so as to increase profit on sustainable basis.

Choice of Variety

At present, good choice of improved varieties is available to farmers for growing under different production conditions.

Choice varieties of wheat for different zones and production conditions in India

Zone	Production condition	Varieties
Northern Hills Zone (NHZ)	TS-IR-high fertility	HPW 349, HS 507, VL 907, VL 804, VL 738*
	TS-RF-low fertility	HPW 349, HS 507, VL 907, SKW 196*, VL 804, VL 738*, TL 2969 (trit), TL 2942 (trit)
	ES-RF-low fertility	HS 542, HPW 251, VL 829
	LS-RI-medium fertility	VL 892, HS 490, HS 420
	High altitude areas	VL 832, HS 375
North Western Plains Zone (NWPZ)	TS-IR-high fertility	DBW 88, HD 3086, WH 1105, HD 2967, DPW 621-50, PBW 550*, WHD 943(d), PDW 314 (d), PDW 291(d)
	LS-IR-medium fertility	DBW 90, WH 1124, DBW 71, HD 3059, PBW 590, WH 1021, DBW 16, WR 544 (VLS), RAJ 3765*
	TS-RF-low fertility/RI	PBW 644, WH 1080, HD 3043, PBW 396
North Eastern Plains Zone (NEPZ)	TS-IR-high fertility	NW 5054, K 1006, DBW 39, CBW 38, Raj 4120, K 307, HD 2824, HD 2733, PBW 443, HUW 468, NW 1012
	LS-IR-medium fertility	DBW 107, HD 3118, HD 2985, HI 1563, NW 2036, HW 2045, DBW 14, NW 1014, HD 2643
	TS-RF-low fertility	HD 2888, MACS 6145
Central Zone (CZ)	TS-IR-high fertility	MP 3288, HI 1544, GW 366, GW 322, GW 273, HI 8713 (d), MPO 1215 (d), HI 8498(d),
	LS-IR-medium fertility	MP 3336, Raj 4238, MP 1203, HD 2932, HD 2864, MP 4010
	TS-RF-low fertility/RI	DBW 110, MP 3288, MP 3173, HI 1531, HI 8627(d), HI 1500, HD 4672(d), HW 2004 (Amar)
Peninsular Zone (PZ)	TS-IR-high fertility	MACS 6478, UAS 304, MACS 6222, NIAW 917, Raj 4037, GW 322, HUW 510, UAS 428 (d), UAS 415 (d), MACS 2971(dic), HI 8663(d), DDK 1029 (dic), DDK 1025(dic)
	LS-IR-medium fertility	HD 3090, AKAW 4627, HD 2932, Raj 4083, PBW 533, HD 2833
	TS-RF-low fertility/RI	NIAW 1415, HD 2987, PBW 596, HD 2781, K 9644, AKDW 2997-16(d)
Southern Hills Zones (SHZ)	TS-RI-medium fertility	HW 5216, HW 2044, HW 1098 (dic), HW 1085, COW (W) -1
Marginal areas	Salinity-alkalinity condition	KRL 210, KRL 213, KRL 19

Where, TS=Timely Sown, LS=Late Sown, VLS= Very late sown, ES=Early Sown, IR=Irrigated, RF=Rainfed, RI=Restricted irrigation, (d) = durum, dic. = dicoccum and trit = Triticale. *indicates stripe rust susceptibility and thus must be avoided in rust prone areas.

Agronomic Practices

Sowing time, seed rate and fertilizer application: The wheat crop in India is grown across six agro-climatic zones and production conditions. The time of sowing has slight variation from zone to zone and under varying production conditions.

Zone-wise sowing time, seed rate and fertilizer dose for wheat crop

Zone	Sowing conditions	Seed rate	Fertilizer doses and time of application
NHZ	Irrigated timely sown (1-15 Nov.)	100 kg/ha	120:60:40 kg NPK /ha (1/3 N and full P&K as basal at sowing and remaining N in two equal splits at first and second irrigation)
	Irrigated late sown (After 25 th Nov.)	125 kg/ha	90:60:40 kg NPK /ha (1/3 N and full P&K as basal at sowing and remaining N in two equal splits at first and second irrigation)
	Rainfed	125 kg/ha	60:30:20 kg NPK/ha to be applied at the time of sowing
NWPZ and NEPZ	Irrigated timely sown NWPZ: 1-15 Nov. NEPZ: 10-20 Nov	100 kg/ha	150:60:40 kg NPK /ha (1/3 N and full P&K as basal at sowing and remaining N in two equal splits at first and second irrigation)
	Irrigated late sown (After 25 th Nov.)	125 kg/ha	120:60:40 kg NPK /ha (1/3 N and full P&K as basal at sowing and remaining N in two equal splits at first and second irrigation)
	Rainfed	125 kg/ha	60:30:20 kg NPK/ha to be applied at the time of sowing
CZ, PZ and SHZ	Irrigated timely sown CZ: 10-20 Nov PZ: 1-15 Nov SHZ: Mid Nov.	100 kg/ha	120:60:40 kg NPK /ha (1/3 N and full P&K as basal at sowing and remaining N in two equal splits at first and second irrigation)
	Irrigated late sown	125 kg/ha	90:60:40 kg NPK /ha (1/3 N and full P&K as basal at sowing and remaining N in two equal splits at first and second irrigation)
	Rainfed	125 kg/ha	60:30:20 kg NPK/ha to be applied at the time of sowing

Weed management: Based on weed flora following herbicides can be applied.

Options for weedicides to control different types of weeds

Weed flora	Herbicides	Dose (g a.i. /ha) Product dose (g or ml/ha)	Time of application DAS
Grasses	Clodinafop	60	Post emergence 30-35 DAS

	(Topik 15WP)	(400)		
	Fenoxaprop-ethyl (Puma Super 10EC)	100-120 (1000-1200)	Post emergence 30-35 DAS	
	Pinoxaden (Axial 5 EC)	40-50 (800-1000)	Post emergence 30-35 DAS	
	Sulfosulfuron (Leader 75 WG)	25 (33.3)	Post emergence 30-35 DAS	
	Isoproturon (Arelon 75 WP)	1000 (1333)	Post emergence 30-35 DAS	
	Pendimethalin (Stomp 30EC)	1000-1500 (3333-4950)	Pre-emergence 1-3 DAS	
Broad-leaved weeds	2,4-D-E (Weed war 38 EC)	500 (1315)	Post emergence 30-35 DAS	
	Metsulfuron (Algrip 20 WP WP)	4 (20)	Post emergence 30-35 DAS	
	Carfentrazone (Affinity 50 WDG)	20 (50)	Post emergence 30-35 DAS	
	Pendimethalin (Stomp 30EC)	1000-1500 (3333-4950)	Pre-emergence 1-3 DAS	
	Both grassy and broad-leaved weeds	Sulfosulfuron (Leader 75 WG)	25 (33.3)	Post emergence 30-35 DAS
		Pendimethalin (Stomp 30EC)	1000-1500 (3333-4950)	Pre-emergence 1-3 DAS
Isoproturon (Arelon 75WP)+2,4-D E		750 + 500 (1000+1315)	Post emergence 30-35 DAS	
Sulfosulfuron+ metsulfuron (Total 80WG)		30 +2 (40)	Post emergence 30-35 DAS	

- In areas having the problem of isoproturon resistant *P. minor* use sulfosulfuron, or clodinafop or fenoxaprop or pendimethalin or pinoxaden. Sulfosulfuron, and pendimethalin are effective against both grassy and non-grassy weeds whereas, clodinafop, fenoxaprop, and pinoxaden are specific to grasses.
- Grass herbicides (clodinafop, fenoxaprop, and pinoxaden) should not be tank mixed with either 2,4-D or metsulfuron and to avoid antagonism the grass and broad-leaved herbicides should be applied sequentially.

Water management: The normal practice of applying four to six irrigations (28-42 cm-ha water) are enough for wheat crop. Depending upon the water availability, irrigation should be applied as per the scheduled.

Irrigation scheduling (number and stage) depending on amount of water availability

Water Availability	Crown root initiation (21 DAS)	Tiller Completion (45DAS)	Late Jointing/ Boot (65 DAS)	Heading/ flowering (85 DAS)	Milk stage (105 DAS)	Dough (120 DAS)
1 Irrigation	√					
2 Irrigations	√			√		
3 Irrigations	√		√		√	
4 Irrigations	√	√	√		√	
5 Irrigations	√	√	√	√	√	
6 Irrigations	√	√	√	√	√	√

Crop Protection

The host resistance is the cheapest, effective and environmental friendly means management of disease and pests. The disease scenario of different zones varies but the problem of yellow rust disease which is prevalent in northern and southern hills, north western and north eastern plains of the country is a major cause of concern. Karnal bunt incidence increased during last 3-4 years in NWPZ.

Rust management: In NWPZ and NHZ, stripe rust (yellow rust) is very important. Usually, it is observed that the early infection of stripe rust starts in wheat fields under the poplar trees wherever these are grown having early sown crop (i.e. October). Hence, strict watch is needed by the farmers in such fields. More over for avoiding the losses due to stripe rust of wheat in NWPZ, recommended varieties be sown.

Since most of the varieties recommended for NWPZ and NHZ do not carry high level of resistance, hence, chemical sprays are needed. Spray the crop with Propiconazole (Tilt 25 EC @ 0.1 per cent), or Tebuconazole (Folicur 250EC @ 0.1%) or Triademefon (Bayleton 25WP @ 0.1%) at stripe rust initiation using 200 litres of water/ha. Usually, it is required in the first half of February.

Stem and leaf rusts are the major diseases of wheat in CZ, PZ and SHZ. From rust epidemiology point of view, for disrupting the *Puccinia* path, rust resistant varieties should be grown in respective zone.

Loose smut: Loose smut is a seed borne disease. In view of the horizontal distribution of the seed material among the farmers and the use of the carry over seed effective control measures for loose smut should be undertaken. For this, seed treatment with Carboxin (75 WP @ 2.5 gm/kg seed) or Carbendazim (50 WP @ 2.5 gm/kg seed) or Tebuconazole (2DS @ 1.25 gm/kg seed) or a combination of a reduced dosage of Carboxin (75 WP @ 1.25 gm/kg seed) and a bioagent fungus *Trichoderma viride* (@ 4 gm/kg seed) is recommended.

Integrated management of loose smut involving reduced dosage of chemical fungicide and bioagent fungus is more eco-friendly and equally effective as the chemical control measures and thus should be preferred. Use of bioagents also helps in improving the initial vigour of the crop. Seed treatment with fungicide should be done one or two days before sowing. In case of integrated management, the treatment with *T. viride* should be done 72 hrs before sowing, followed by the fungicide, 24 hours before sowing.

Flag smut: Flag smut disease also poses problems in isolated fields in Punjab, Haryana, Rajasthan and some other parts of NWPZ. Disease management measures taken for the control of loose smut disease (as discussed above), prove to be effective against flag smut too. Hence, seed treatment with carboxin or tebuconazole may be followed in fields with flag smut history.

Karnal bunt: Karnal bunt (KB) control is required for seed crop and the produce grown for export purposes. For producing KB free wheat, farmers are advised to grow KB resistant varieties recommended for the respective area.

- ✓ In areas where Karnal bunt incidence is low, by growing durum wheat for 2-3 years, fields can become free from Karnal bunt pathogen, *Tilletia indica*
- ✓ Zero tillage helps in reducing Karnal bunt incidence.
- ✓ Avoid irrigation at heading time
- ✓ One spray of Propiconazole 25EC (Tilt 25 EC) @ 0.1 per cent or Tebuconazole 250 EC (Folicur 250 EC) @ 0.1 per cent using 200 litre of spray solution be given in mid February to control the disease.
- ✓ In KB prone areas, the seed crop can be given one spray of propiconazole or two sprays of *T.viride* at tillering and ear head emergence stage.

Powdery mildew: For the control of powdery mildew in disease prone areas, one need-based spray of propiconazole (Tilt 25 EC @ 0.1%) can be given at ear head emergence or appearance of disease on flag leaf, whichever is earlier.

Foliar blight: Foliar blight is the main crop health problem in NEPZ. For effective management of the diseases, cultivation of recommended (resistant) varieties, like HD 2985, HI 1563, DBW 39, CBW 38, NW 1014, NW 2036, K 9107, HD 2733 (resistant to LB), DBW 14, HD 2888, K0307, DBW39 and HUW 468 should be encouraged.

Termite: In the termite prone areas, seed treatment with chloropyriphos @ 0.9g a.i /kg seed (4.5 ml product dose / kg seed), be taken up for their management. Seed treatment with thiamethoxam 70WS (Cruiser 70WS) @ 0.7 g a.i./kg seed (4.5 ml product dose / kg seed) or Fipronil (Regent 5FS @ 0.3 g a.i./kg seed or 4.5 ml product dose / kg seed) is also very effective.

Pink stem borer: The incidence of pink stem borer is observed more in fields of rice-wheat cropping system where wheat is sown in zero tillage fields. For its management, foliar spray of quinalphos (Ecalux) 800 ml /acre as soon as pink stem borer is seen. Irrigation also helps in reducing the pink stem borer damage.

Aphids: For the management of aphids, foliar spray of imidacloprid 200SL @20g a.i./ha on border rows at the start of the aphid colonization be given. This will help in protection of the bioagent insect, the lady bird beetle inside the field which feeds on aphids.

Ear cockle: Ear cockle is an important disease in eastern parts of India, hence proper precautions be taken, especially in eastern U.P., Bihar and Jharkhand. Wider publicity should be given by extension agencies on the use of gall-free seed, well before the sowings. Farmers should adopt floatation technique for the separation of galls from the infested seed lots. The infested seed lot should be floated in 2 percent brine solution for this purpose. The galls will float on the surface. These should be separated and destroyed away from the field by burning. The seed should be thoroughly washed to remove the salt solution before sowing.

General Tips

- ✓ Choose the best suitable variety for your area and condition
- ✓ Follow timely planting and avoid delay in sowing of wheat crop to avoid yield losses due to adverse effects of heat around maturity.
- ✓ Do not grow varieties from other zones to avoid risk of disease susceptibility
- ✓ Manage your crop with optimum inputs (fertilizer, irrigation water, herbicides and fungicides) for maximum yield.
- ✓ Timely and judiciously irrigate fields to save water and cut costs.

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