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Short Communication

COLLECTING *Triticum* SPECIES FROM SALT AND HEAT AFFECTED AREAS OF GUJARAT AND RAJASTHAN

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A joint germplasm collection mission to salt and heat affected areas of Gujarat and Rajasthan was undertaken to collect different species of *Triticum* during March-April 1998. In all, 52 samples consisting of *Triticum aestivum* (30), *T. dicoccum* (7), *T. durum* (12), *T. sphaerococcum* (1) and unidentified species of *triticum* (2) were assembled from Ahmedabad, Amreli, Banaskantha, Bhavnagar, junagarh, Kachchh, Porbandar, Rajkot (Gujarat), Barmer, Jalor, Jodhpur, Pali and Sirohi (Rajasthan) districts. A wide range of variability was recorded.

Key words : *Triticum* species, collection; germplasm, variability

India has been an important source of genetic diversity in wheat which has played a key role in keeping the wheat improvement programme vibrant (Tandon and Mathur, 1988; Gill, 1994 and Nagarajan and Ghanshyam Singh, 1998). A joint germplasm collection mission was undertaken to collect variability in landraces/old primitive cultivars of different species of *Triticum* from salt and heat affected areas of Gujarat and Rajasthan, India.

This mission was completed in collaboration with Directorate of Wheat Research, Karnal, Haryana during March 17 to April 1, 1998. Route followed and area covered are shown in Fig. 1. Officers of Krishi Vigyan Kendras/Gujarat Agriculture University/Gujarat Agriculture Departments/progressive and marginal farmers/local tribal people were contacted during this expedition to get first hand knowledge about the genetic diversity/primitive or/traditional cultivars available in particular pockets and accordingly exploration route was followed. In all 52 samples comprising *Triticum aestivum* L. (common wheat, 30), *T. dicoccum* Schubls (Emmer, 7), *T. durum* Desf. (Durum or Macaroni, 12), *T. sphaerococcum* (shot wheat, 1) and unidentified species of *Triticum* (2) were collected (Table 1) from 49 diverse sites lying between 20°7' to 26°25'N latitude; 69° to 75°3' E longitude and 0 to 300 m altitude. The survey sites represented salt and heat effected zones. Biased, random and bulk procedures were followed for collecting at least 10 panicles at each site. Passport data were recorded alongwith important plant characters like plant height; number of tillers; panicle length and type; glume colour; length, number and colour of awn; size, shape, colour and hardiness of grain; maturity and threshability.

Collections of different species of *Triticum* L. were made from farmers field and threshing yards. The important sites are given in Table 2.

Table 1. Collection of *Triticum* species from salt and heat affected areas of Gujarat and Rajasthan

States	Districts	Number of collection of different species- sites					Total collections
		1	2	3	4	5	
Gujarat	Ahmedabad	-	-	4(4)	-	-	4(4)
	Amreli	-	-	3(3)	-	2(2)	5(5)
	Banaskantha	4(4)	-	2(2)	-	-	6(6)
	Bhavnagar	1(1)	-	1(1)	-	-	2(2)
	Jamnagar	5(4)	2(2)	2(2)	1(1)	-	10(9)
	Junagarh	-	3(3)	-	-	-	3(3)
	Kachchh	1(1)	-	-	-	-	1(1)
	Porbandar	-	2(2)	-	-	-	2(2)
	Rajkot	2(2)	-	-	-	-	2(2)
Rajasthan	Barmer	5(4)	-	-	-	-	5(4)
	Jalor	3(3)	-	-	-	-	3(3)
	Jodhpur	1(1)	-	-	-	-	1(1)
	Pali	7(6)	-	-	-	-	7(6)
	Sirohi	1(1)	-	-	-	-	1(1)
2	14	30(27)	7(7)	12(12)	1(1)	2(2)	52(49)

1. *T. aestivum* 2. *T. dicoccum* 3. *T. durum* 4. *T. sphaerococcum* 5. unidentified species

In-situ variability in germplasm collected

1. *Triticum aestivum* L

In all 30 collections were made from sites of Banaskantha (4), Bhavnagar (1), Jamnagar (5), Kachchh (1) and Rajkot (2) districts of Gujarat and Barmer (5), Jalor (3), Jodhpur (1), Pali (7) and Sirohi (1) districts of Rajasthan at the elevation of 20-260; 100, 40-120, 125, 60, 160-190, 20-250, 230, 240-300 and 250 m above msl respectively. A wide range of variability was noticed in plant height (69-158.2 cm); number of tillers (4-15); maturity (60-150 days); stem fill up (solid/hollow/fragile); number of nodes per tiller (5-9); internodal distance (6.1-15.3); rachis (tough/brittle/straight/bent); colour of glume and awn (white/straw/yellow/bright yellow/ brown/ black); length of ear (4-11.6 cm) and awn (short/

Table 2. Different *Triticum* species and sites of collection in Gujarat and Rajasthan

Species	Gujarat	Rajasthan
T. aestivum Linn.	Gason-Tal, Deodar, Manpura- Tal. Santalpur, Moti Pipali-Tal. Radhanpur, Navanapavdar-Tal. Danta (Banaskantha); Jeera (Bhavnagar); Taran, Dudhai-Tal. Jodiya, Harsadpur-Tal. Jamnagar (Jamnagar); Bodalgarh-Tal. Rapar (Kachchh); Maliya, Veerpur (Rajkot)	Samdari, Ramaniya-Teh.Shivana (Barmer); Akoli, Kotada-Teh. Bhinmal, Prawa-Teh.Sanchor (Jalor); Shikarpura- Teh. Luni (Jodhpur); Netra-Teh. Bali; Barsa, Kharchi, Chawadiya, Suryanagar-Teh. Marwar Junction; Mukundra-Teh. Rohit (Pali); Barewara-Teh. Shivganj (Sirohi).
T. dicoccum Schubl	Khambaliya (Jamnagar); Khakarwara, Rampara, Jakarwara-Deu Road-Tal. Una (Junagarh); Sodana, Bhumiyavdar (Porbandar).	
T. durum Desf.	Raika, Pipali-Tal. Dhandhuka; Bhuraki, Mithapur-Tal. Dholaka (Ahmedabad); Nana Gokharwada, Saladi, Mota Liliya-Tal.Liliya (Amreli); Varahi, Manpura-Tal. Santalpur (Bansakantha); Vallabhipur (Bhavnagar); Dudhai-Tal. Jodiya (Junagarh).	
T. sphaerococcum Perc.	Harsadpur (Jamnagar)	-
T species	Jamnagar (Jamnagar); Dewaliya (Amreli)	-

Tal. = Taluka; Teh. = Tehsil.

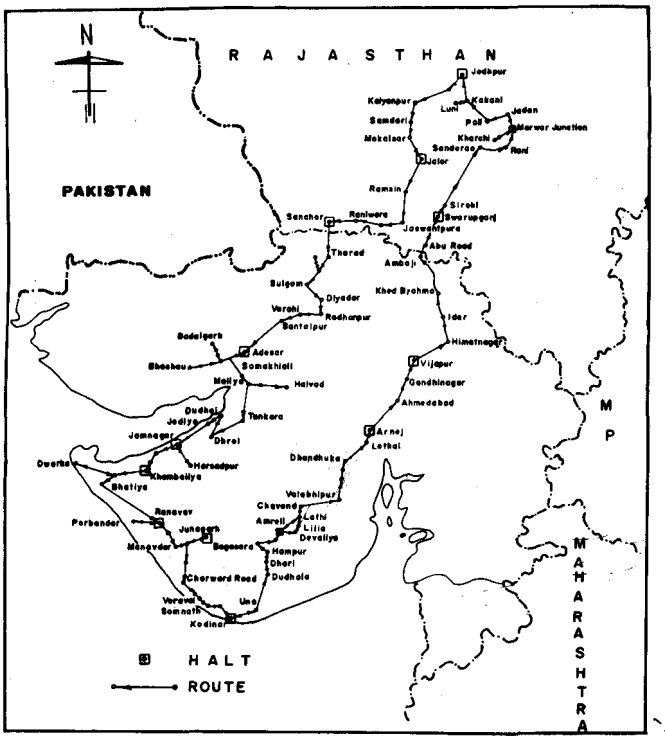

Fig. 1. Collection of wheat (Triticum spp.) from salt and heat effected areas of Gujarat and Rajasthan

medium/long); awn (present/absent); number of grains per ear (21-44); colour (white/ brown/ amber/red/yellow), size (small/medium/medium large) and shape (roundish/ elongated/ oval/ ovoid/dumbled/plumpy/swollen/wrinkled) of grain; threshability (easy/medium hard) and 100 seed weight (31-40 g). Local names appended in Table 3. Crop matures 15-20 days earlier in Amreli and Junagarh districts of Gujarat due to hot and drier climate.

2. *T. dicoccum* Schubl

Seven collections were made from seven different sites in the coastal areas of Jamnagar (2), Junagarh (3) and Porbandar (2) districts of Gujarat. It was cultivated at the elevation of 30, 0-20 and 75-80 m above msl respectively. Variability was noticed in plant height (94-123.5 cm); number of tillers (4-10); maturity (90-180 days); stem fill up (fragile/tough); number of nodes per tiller (8-15); internodel distance (6.1-15.3 cm); rachis (tough/ brittle/ straight/ zigzag); colour of glume and awn (white/ straw/ yellow/brown); length of ear (6.8-7.9 cm) and awn (6.8-10 cm); number of grains per ear (32-36); colour (white, dark brown, red), shape (norrow, pointed at both the ends with deep or shallow furrow) and size (0.8 × 0. 3-1.0-0.25 cm) of grains, threshability (hard/very hard) and 1000 seed weight (32-38 g). Local names were recorded (Table 3).

3. *T. durum* Desf.

Twelve collections were made from Ahmedabad (4), Amreli (3), Banaskantha (2), Bhavnagar (1) and Jamnagar (2) districts of Gujarat at the elevation of 25-85, 100-150, 40, 25 and 40 m above msl respectively. Variability was observed in plant height (71.4-94.8 cm); number of tillers (7-12); maturity (100-195 days); stem fill up (fistular/solid); number of nodes per tiller (10-15); internodal distance (5.5-15.2 cm); rachis (tough/disarticulating); colour of glume and awn (white/straw/brown/blackish brown); glume (glabrous/hairy); length of ear (6.2-7.8 cm) and awn (6.8-15 cm); number of grains per ear (26-45); colour (white/or red/brown), shape (long, narrow with prominent dorsal ridge), size (.7 × 25-1.0 × .3 cm), hardiness (low/medium/very hard) and threshability (easy/free) of grains and 1000 seed weight (33-39 g). Local names appended (Table 3).

4. *T. sphaerococcum* Perc.

Single collection of Indian dwarf wheat was made from a farmers field in the village Harsadpur of district Jamnagar (Gujarat) at an elevation of 120 m above msl. The average plant height and number of tillers were 118.8 cm and 25 respectively. It matures in 135 days. Rachis was soft and brittle. Glume was of straw colour. The ear length (Fig. 2) varies from 4.5 to 5.5 cm.

Table 3. Local names of different *Triticum* species collected

Triticum species	Local names/land races/primitive cultivars
Triticum aestivum Linn.	Bodiya gehum (Banaskantha), Desi geun, Desi ghaun (Barmer), Desi kanak (Pali), Kharchiya (Jodhpur, Pali), Lal ghaun (Jalore), Sachchiya (Bhavnagar), Vijya (Sirohi)
T. dicoccum Schubl.	Jau (Junagarh), Popatiya (Jamnagar), Putadiya, Putragehun (Porbandar) and Putrajau (junagarh)
T. durum Desf.	Arnej gehun (Banaskantha), Arnej Katha (Ahmedabad)
T. sphaerococcum Perc.	Patoliya (Jamnagar)
T. species	Nana ghun (Jamanagr), Tukara (Amreli)

Grains (Fig. 3) were small (5 × 4 mm), plumpy/swollen, roundish, grooved, amber in colour and easily threshable. Farmer called it by its local name (Table 3).

Irrigation and cropping pattern

Out of 52 collections 41 were grown in irrigated conditions. Four to nine irrigations were given in *T. aestivum*. In *T. dicoccum* 5, 9 and 13 irrigations were given in collections made from Jhakarwada (Junagarh), Khambaliya (Jamnagar) and Sodana (Porbandar) respectively. One (Bhuraki, Ahmedabad) to 18 (Mota Liliya, Amreli) irrigation were given in *T. durum* while 13 irrigations was given in *T. sphaerococcum*. Eleven collections comprising of *T. aestivum* (5) and (*T. dicoccum* (6) were made from rainfed areas of Gujarat and Rajasthan.

Tribal people of Ahmedabad, Jamnagar, Junagarh and Porbandar districts of Gujarat grow these *Triticum* species alongwith *Allium cepa*, Barley and Oat were grown in separate fields with poor to average agronomic practices. Seeds of these crops stored in future use after keeping either dried leaves in/or mixing with ash of leaves of Neem tree (*Azadirachta indica* A. Juss.) by tribal people to protect them from insect attack.

Replacement by high yielding varieties

It was recorded that old local types of wheat have been replaced by new high yielding released varieties like Loc-1, J-17, J-24, JW-496, JW-50.3, Kalyansona, Sonalika (Gujarat), Kharchiya-65,

Fig. 2. Ears of *T. sphaerococcum*

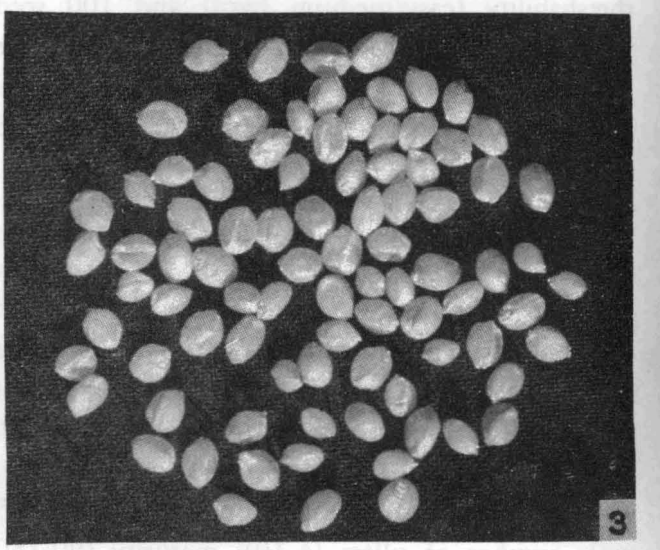

Fig. 3. Grain of *T. sphaerococcum*

Raj-1482, Raj-1593, Raj-3077 and Raj-3765 (Rajasthan) around urban areas, while in tribal dominating belts, local types are still in cultivation. Tribal people believe that the old landraces or primitive cultivars are tasty and good for health.

Uses

Flour of *Triticum* species is used for making chapatis (Roti/Rotala/Bhakhari). A variety of other preparations like sweet dishes (Laddu, Lapsi, Halwa, Magad, Galwani, Rawa, Siwian, Kheer, Churma), salty dishes (Batiya, Daliya, Dhokali, Ghat, Lengat) and boiled entire seeds (Gugariyan) are eaten on certain occasions by tribal people of these States. The chaff is fed to animals.

The germplasm of *Triticum* species collected from these parts of Gujarat and Rajasthan is a good source for salt and drought tolerance and may be used in various varietal improvement programmes.

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