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COMPARATIVE EVALUATION OF PRIMITIVE GENETIC STOCKS OF WHEAT COLLECTED FROM TWO HIMALAYAN CENTRES OF DIVERSITY

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Investigations on twelve primitive wheat accessions collected from the mirco-centres of diversity (northern Pakistan and northern India) were conducted for comparative evaluation of genetic variability for an array of characters. A fair amount of genetic variability was displayed by the quantitative characters under observation. The variability exhibited by the qualitative characters was of lesser amount.

The promising and desirable genotypes from the genetically variable material could be utilized for evolving high yielding disease resistant, good quality wheat varieties, through wheat breeding and by hybridization programme.

Key words: Primitive genetic stocks, Himalayan centres of diversity; *Triticum aestivum* L.

INTRODUCTION

Due to extensive hybridization among the existing genotypes, the genetic variability is liable to be exhausted in the future. A more precise evaluation of primitive and genetically adapted genotypes could be useful for the incorporation of heritable variations in modern varieties. The production of wheat in Pakistan is now sufficient to meet the total requirements of the country, yet the yield per acre is low as compared to most of the wheat growing countries of world. The yield per acre of wheat can be increased by evolving high yielding and disease resistant varieties with the utilization of primitive genetically variable germ plasm.

The primitive wheat and barley from northern Pakistan (Himalayan centre of diversity) were examined by Gilani and Whitcombe [1, 2] and Qualset [3] examined the genecology of barley collected over a large area of Ethiopia. Rao and Witcombe [4] described the distribution of morphological variability of quantitative and qualitative characters of wheat in Nepal. They concluded that gene flow was greater within regions than among regions. This regional isolation together with environmental heterogeneity were major diversity promoting mechanisms. Rao [5] examined the phytogeographic distribution of genetic variability in primitive wheat accessions from northern Pakistan. He observed that accessions differed greatly in disease reaction, awn length, colour of auricle, flag leaf length, number of days to earing, ear length and yield per plant. Rabasa [6] advised the conservation of potentially useful populations for the improvement of future varieties.

In the present investigation, a dozen wheat accessions from two Himalayan microcentres were chosen for a comprehensive analysis of various quantitative and qualitative characters.

MATERIALS AND METHODS

Field investigations were carried out in the experimental area of the Plant Breeding and Genetics Department, University of Agriculture, Faisalabad, during the season 1980-81. Twelve accessions from two Himalayan centres of diversity (Sketch map 1) were sown in randomized complete block design in four replications for comparative evaluation.

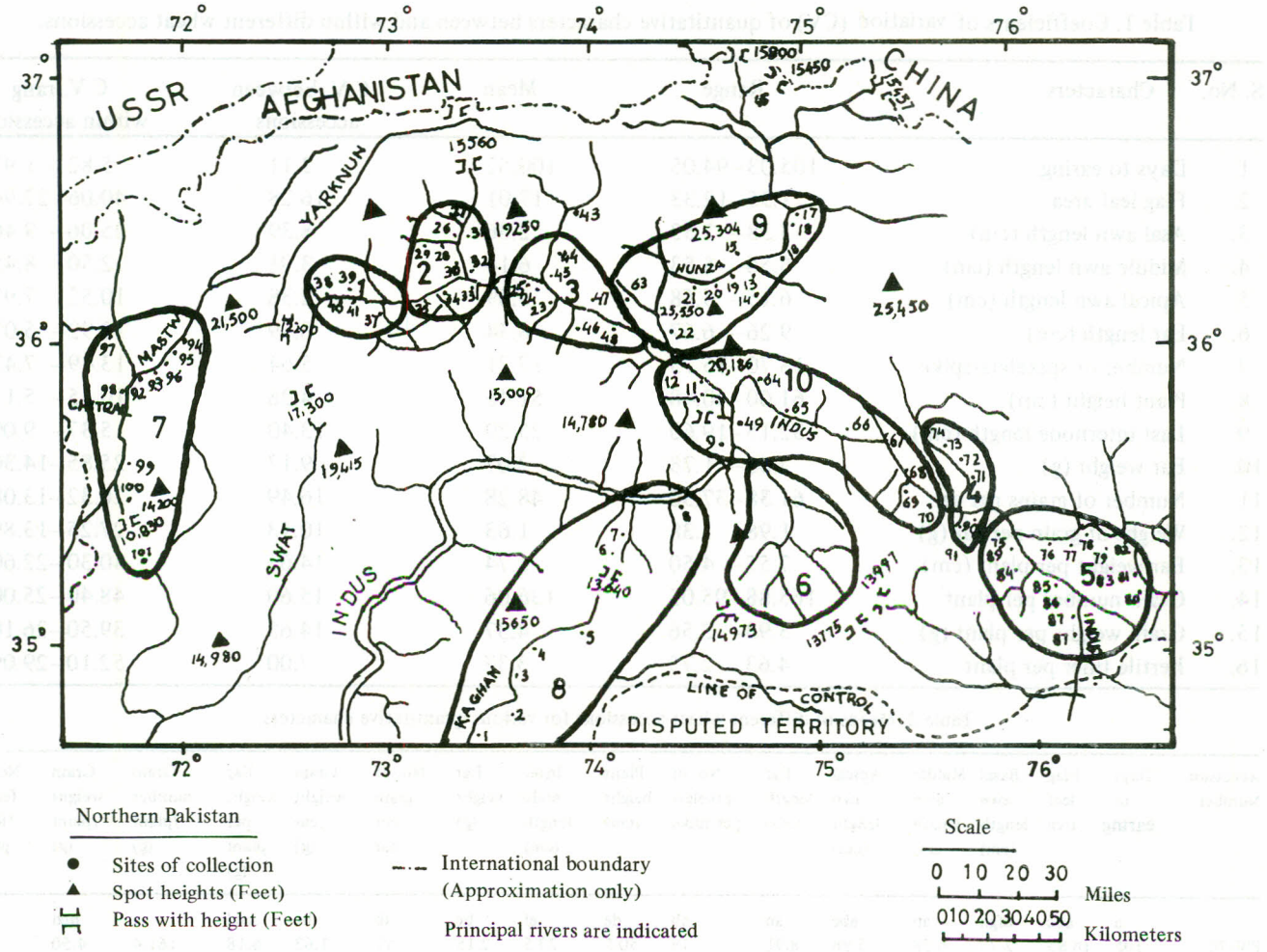
These strains were sown in a plant configuration of 30 x 15 cm in an experimental unit of 4.5 m^2 area during early November. Ten plants were selected randomly from each strain and replication to record quantitative data. The data on length of flag leaf were recorded at the green stage and by the formula of [7] i.e., (L x W) x 0.83 (in square

Table 1. Coefficients of variation (CV) of quantitative characters between and within different wheat accessions.

S. No.	Characters	Range	Mean	C.V. between accessions	C.V. rang within accessions
1.	Days to earing	105.03–94.05	100.52	2.11	5.82– 1.97
2.	Flag leaf area	21.35–12.33	17.01	16.28	40.06–22.94
3.	Asal awn length (cm)	3.38– 2.53	2.86	8.39	25.06– 9.46
4.	Middle awn length (cm)	6.56– 5.53	6.14	3.91	12.50– 8.45
5.	Apical awn length (cm)	6.15– 5.58	5.89	2.38	10.52– 7.91
6.	Ear length (cm)	9.26– 6.67	8.34	8.99	13.92– 5.07
7.	Number of spikelets/spike	18.70–15.75	17.21	5.64	13.49– 7.43
8.	Plant height (cm)	61.00–40.48	51.46	4.28	10.45– 5.11
9.	Last internode length (cm)	32.15–19.60	25.29	13.40	15.37– 9.00
10.	Ear weight (g)	2.68– 1.78	2.07	9.17	25.85–14.30
11.	Number of grains per ear	61.38–37.30	48.28	16.49	26.32–13.08
12.	Weight of grain per ear (g)	1.98– 1.38	1.63	10.43	27.25–13.89
13.	Ear weight per plant (cm)	7.55– 4.50	5.74	14.63	40.30–22.60
14.	Grain number per plant	165.88–95.05	136.06	15.60	48.40–25.00
15.	Grain weight per plant (g)	5.93– 3.56	4.37	14.65	39.50–26.10
16.	Fertile tiller per plant	4.63– 2.75	3.37	7.00	52.10–29.09

Table 2. Means of different wheat accessions for various quantitative characters.

Accession Number	Days to earing	Flag leaf area	Basal awn length (cm)	Middle awn length cm)	Apical awn length (cm)	Ear length (cm)	No. of spikelets per spike	Plant height (cm)	Inter node length (cm)	Ear weight (g)	No. of grain per ear	Grain weight /ear (g)	Ear weight per plant (g)	Grain number /plant (g)	Grain weight /plant (g)	No. of fertile tiller/ plant
	a	abc	efgh	ab	abc	ab	ab	de	ef	bc	ab	bc	bcd	a	bcd	bc
PW-70	105	18.85	2.73	6.38	5.98	8.91	19	50.5	23.5	2.15	57	1.63	6.18	161.4	4.50	3.5
	a	c	bcdef	abc	bcd	c	abc	cd	f	cde	ab	ab	bcd	ab	bcd	bcd
PW-593	105	16.93	2.88	6.30	5.88	8.03	18	51.8	23.8	2.10	55	1.75	6.00	160.9	4.65	3.4
	a	abc	h	a	a	a	a	de	ef	cde	a	bc	def	abcd	de	bcd
PW-92	105	18.25	2.54	6.56	6.15	0.26	19	50.3	24.1	2.08	61	1.53	5.25	148.2	3.85	3.40
	a	e	a	ab	ab	bc	cd	a	a	cde	def	ab	ab	abc	ab	a
PW-7	104	12.38	3.38	6.38	6.08	8.44	12	61.0	32.2	2.10	44	1.75	6.68	150.8	5.25	4.6
	a	bc	defgh	abc	abc	bc	abcd	bcd	ef	cdef	bcd	bc	ef	cdef	de	cd
PW-20A	104	17.68	2.75	6.20	5.98	8.28	17	52.4	24.5	2.00	50	1.63	4.93	124.8	3.93	3.0
	a	c	efgh	abc	bcd	bc	abcd	e	f	ef	cde	bc	ef	cde	de	d
PW-53	104	16.40	2.73	6.23	5.90	8.27	17	48.7	23.5	1.83	48	1.48	4.95	129.2	3.88	2.3
	a	ab	bcd	abc	bcd	ab	ab	de	f	a	ab	a	bc	abc	bed	bed
W-148	104	2068	3.03	6.18	5.90	8.93	18	49.9	23.6	2.68	58	1.93	6.40	152.4	4.50	3.3
	a	bc	gh	d	a	bc	abc	e	g	cdef	bc	bc	ef	bcde	de	d
PW-10	103	17.68	2.55	5.53	5.58	8.38	18	48.1	21.3	1.98	53	1.65	4.83	134.5	3.75	2.8
	b	de	bc	cd	ab	d	d	bcd	de	def	ef	bc	f	f	e	cd
PW-34-π	98	12.83	3.13	5.80	6.05	6.68	16	51.9	25.4	1.85	40	1.48	4.50	95.1	3.56	3.1
	abc	de	dc	bc	cde	d	d	dc	cd	cdef	ef	bc	cdef	def	cde	bcd
PW-100	96	12.73	3.06	6.05	5.75	6.67	16	54.3	26.5	2.00	40	1.50	5.43	114.3	4.10	3.3
	bc	cd	fgh	bc	dc	abc	bed	f	h	ef	f	c	cde	ef	cde	bcd
Yecora	96	16.05	2.65	6.05	5.73	8.63	17	40.5	19.6	1.78	37	1.38	5.53	111.9	4.18	3.3
	c	a	efgh	abc	cde	ab	abcd	b	b	a	bc	a	a	a	a	b
W-235	95	21.35	2.78	6.13	5.80	8.83	17	55.0	29.4	2.45	52	1.98	7.55	165.9	5.93	3.9
	c	abc	bcde	abc	bcd	abc	d	b	b	def	f	e	bcd	bcde	cde	bc
W-128	95	18.55	3.00	6.08	5.85	6.68	16	54.9	29.5	1.85	40	1.40	5.98	131.7	4.28	3.6
	c	bc	cdefg	abc	bed	abc	cd	bcd	c	c	ef	ab	dcd	cdef	bc	cd
PWP-79	94	17.7	2.83	6.13	5.88	8.78	17	52.1	27.4	2.13	41	1.73	6.15	124.0	4.80	3.2
STAT.SIG	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S	H.S
LSD(P=0.05)	2.95	3.38	0.30	0.51	0.25	0.73	1.66	3.17	1.60	0.28	7.52	0.28	1.03	30.13	0.92	0.69



Map showing the area of collection divided into ten regions on the basis of the ordination.

centimeters). The grain yield and its components were recorded at maturity. The statistical data analysis on means, variances, standard deviations and co-efficients of variability were calculated according to standard techniques [8].

RESULTS AND DISCUSSION

The results of quantitative characters recorded on twelve accessions along with two standards (Table 1 and 2) showed a large amount of genetic variability between and within accessions. The findings of these investigations revealed that the prevalent genetic variability in some of the accessions may be of considerable importance to future wheat breeding and hybridization programme. The extent of variability exhibited among and within different accessions was compared on the basis of co-efficient of variation. These findings are consistant with those of [9, 10, 11, 1, 2, 5, 4].

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