CRP Dryland Systems

Technical report – 2014

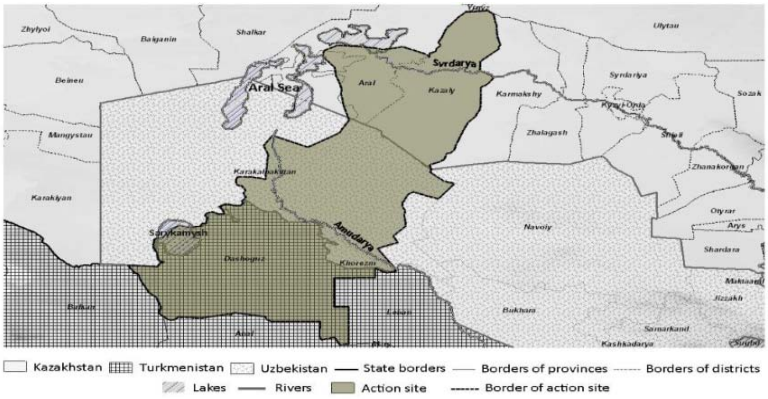
Cluster of activity

Identify and introduce stress tolerant, high-yielding and improved quality varieties of cereals, potato, vegetable, horticultural, fodder crops through on-farm adaptive trials.

Reporting Center: ICARDA

Supporting CRP: CRP WHEAT

Action site: Aral Sea Region



Problem addressed:

Salinity and frost are two important perennial abiotic constraints to successful winter wheat cultivation in Aral Sea region. There are limited options of salinity and frost tolerant winter wheat varieties to the farmers in the region.

Outputs

1. Two hundred nine improved winter wheat germplasm were evaluated on medium level saline field under frost conditions.
2. A second set of 150 winter wheat varieties and advanced breeding lines were evaluated for frost tolerance under two (2-cm and 4-cm) seeding depths.

Outcomes:

1. Twenty five winter wheat genotypes superior to the local check in performance were identified.
2. Six candidate cultivars of winter wheat were identified.
3. Ninety seven frost tolerant improved winter wheat germplasm were identified.
4. Planting wheat at 4 cm depth provides better frost protection than shallower depth.

Partners:

- Research Institute of Crop Husbandry (KRICH), Chimbay – implementation of activity by conducting the field trials.
- Khorezm Rurual Advisory Support Services (KRASS), Urgench - implementation of activity by conducting the field trials.
- Kashkadarya Research Institute of Grain Breeding and Seed Production, Karshi – providing germplasm for field trials.
- Uzbek Research Institute of Plant Industry, Kibray – support in supervision of field trials and data collection.
- District Administration, Chimbay District – administrative support in successfully completing the field trials.

Experiment 1: Performance of salinity tolerant winter wheat varieties

Objective:

Identify high yielding salinity and frost tolerant winter wheat varieties for Aral Sea region, compared to the locally grown commercial varieties.

Materials and methods

Number of location: 2 (Chimbay and Urgench)

Number of varieties evaluated: 20 (Table 1)

- 17 experimental line previously selected for salinity tolerance in Karshi and Urgench, Uzbekistan under BMZ funded project on salinity tolerant winter wheat
- Three checks:
  - Krasnodar-99 (grown locally)
  - Yaksart (new high yielding variety developed for other parts of Uzbekistan)
  - Shams (a candidate cultivar submitted to the State Variety Testing Commission in 2014)

Experimental design: RCBD in two reps.

Plot size: 10 m^2

Planting date: 23 September 2013

Characters evaluated: frost kill (%), grain yield, 1000-kernel weight (TKW), days to heading (DHD), days to maturity (DMT), plant height, different quality traits, and visual field selection.

Results and discussion

- Frost occurred during third week of February when temperatures reached around -25°C for several days in Chimbay.
- Seven experimental lines were severely affected by frost in Chimbay (Table 1)
- Four (Genotype 6, 12, 13 and 17) of the 17 experimental lines showed 55 to 93% frost kill (Table 1).
- In Urgench, there was less effect of frost, and eight susceptible wheat genotypes suffered from frost injury, and recovered later but not to full extent (Table 2).
- The wheat genotypes varieties differed significantly for grain yield at both locations (Table 1 and Table 2).
- The experimental genotypes 10 and 20 were superior for yield at both locations.
- The newly released variety Yaksart showed high yield at both locations.

Table 1. Performance of salinity tolerant experimental lines of winter wheat at Chimbay, Uzbekistan, 2014

Entry	Name	Field selected (May)	Field Selected (June)	Grain yield (t/ha)	1000-kernel weight (g)	Frost kill (%)	Days to heading	Days to maturity	Plant height (cm)
1	Krsnodar-99 (Local Check)	√		4.858	47.5	0	213	253	86
2	Yaksart	√	√	5.500	51.0	0	213	254	85
3	Shams								
4	14IWWYTIR-15	√√		4.975	53.0	0	218	255	85
5	14IWWYTIR-20								
6	14IWWYTIR-23					95			
7	14IWWYTIR-24			3.871	50.0	0	215	254	83
8	14IWWYTIR-27			4.348	46.0	30	216	258	86
9	14IWWYTIR-28	√		4.456	53.0	0	218	254	86
10	14IWWYTIR-29	√√	√√	6.654	55.0	0	214	256	82
11	14IWWYTIR-32			3.156	49.0	35	217	255	87
12	14IWWYTIR-37					70			
13	14IWWYTIR-39					93			
14	14IWWYTIR-40			3.870	48.0	0	217	255	86
15	UZ-11CWA-24	√√	√√	5.758	53.5	0	214	253	88
16	10AYTIR-9014	√		5.202	50.0	0	216	254	85
17	11AYTIR-9014					55			
18	11AYTIR-9026			2.608	58.0	40	217	255	90
19	Victoria	√		5.008	56.0	0	216	255	87
20	Kiriya	√√	√	5.901	54.5	0	215	253	84
	$LSD_{0.05}$			1.399	4.5	22	1	3	7
	CV (%)			13.0	3.9	38.7	0.3	0.5	3.0

Table 2. Performance of salinity tolerant experimental lines of winter wheat at Urgench, Uzbekistan, 2014

Entry	Name	Feld selection (May)	Field Selection (June)	Grain yield (t/ha)	1000-kernel wight (g)	Frost injury (%)
1	Krsnodar-99 (Local Check)	√		4.199		0
2	Yaksart	√√	√	5.787		0
3	Shams			4.733		63
4	14IWWYTIR-15	√	√	5.031		0
5	14IWWYTIR-20			4.552		70
6	14IWWYTIR-23			4.119		73
7	14IWWYTIR-24	√√	√√	5.443		4
8	14IWWYTIR-27	√	√	5.741		0
9	14IWWYTIR-28			4.654		11
10	14IWWYTIR-29	√√	√√	5.800		0
11	14IWWYTIR-32			4.905		47
12	14IWWYTIR-37			4.871		70
13	14IWWYTIR-39			3.179		87
14	14IWWYTIR-40			4.371		0
15	UZ-11CWA-24	√		4.274		0
16	10AYTIR-9014			4.237		0
17	11AYTIR-9014			4.073		50
18	11AYTIR-9026			4.643		48
19	Victoria	√√	√	5.635		0
20	Kiriya	√√	√	5.599		0
	$LSD_{0.05}$			1.800	4.5	16
	CV (%)			22.7	3.9	36

Experiment 2: Performance of salinity and frost tolerant winter wheat varieties

Objective:

Identify high yielding salinity and frost tolerant winter wheat varieties for Aral Sea region, compared to the locally grown commercial varieties.

Materials and methods

Location: Chimbay

Number of varieties evaluated: 15 (Table 3)

- 14 experimental lines previously selected for salinity tolerance in Karshi and Urgench, and frost tolerance in Urgench, Uzbekistan under BMZ funded project on salinity tolerant winter wheat for Central Asia.
- One check:
  - Krasnodar-99 (most widely grown locally)

Experimental design: RCBD in two reps.

Plot size: 50 m^2

Planting date: 23 September 2013

Characters evaluated: frost kill (%), grain yield, days to heading (DHD), plant height and selection in the field.

Results and discussion

- All 15 genotypes were frost tolerant.
- Three experimental genotypes (UZ10MLY-14, UZ10MLY-20 and Kiriya) yielded significantly higher than
- UZ10MLY-20 was selected as the most superior varieties in the field by the farmers. This has also been selected in the field by the researchers.

Table 3. Performance of salinity tolerant and frost tolerant experimental lines of winter wheat at Chimbay, Uzbekistan, 2014

Genotype I.D.	Name or Selection number	Frost kill (%)	Grain yield (t/ha)	Days to heading	Plant height (cm)	Field selection by	
						Researchers	Farmers
1	Krasnodar-99 (check)	0	2.58	219	89		
35	KR11-9809	0	2.27	221	91		
37	KR11-9811	0	3.52	217	90		
41	UZ10MLY-14	0	4.20 a¶	220	90	√	
42	KR11-9816	0	2.91	218	93		
49	KR11-9824	0	2.99	218	90		
53	KR11-9828	0	1.06	224	95		
54	UZ10MLY-20	0	5.22 a	218	94	√	√
56	KR11-9831	0	3.08	221	87		
60	KR11-9835	0	2.46	219	93		
65	KR11-9840	0	2.83	218	91		
88	UZ-11CWA-24	0	2.36	219	90		
142	Kuyalnik	0	3.74	218	90		
144	Victoria	0	2.86	219	89		
145	Kiriya	0	5.30 a	217	91	√	
	$LSD_{0.05}$		1.53	3	4		

¶ Mean grain yield of the genotypes followed the letter ‘a’ is significantly higher than the local check (Krasnodar-99) based on $LSD_{0.05}$.

Experiment 3: Frost tolerance winter wheat varieties and advanced breeding lines adapted to Central Asia

Objective:

Identify high yielding salinity and frost tolerant winter wheat varieties for Aral Sea region, compared to the locally grown commercial varieties.

Materials and methods

Location: Chimbay

Number of varieties evaluated: 169 (Table 4)

- 17th IWWYT-IR received from IWWIP (International Winter Wheat Improvement Program)

Experimental design: One replication.

Plot size: 1 m^2

Planting date: 23 September 2013

Characters evaluated: frost kill (%), grain yield, 1000, days to heading, days to maturity, and plant height.

Results and discussion

- Frost occurred during third week of February when temperatures reached around -25C for several days in Chimbay.
- Around 51% (87 out of 169) of the genotypes were frost tolerant (<10% frost kill).
- Among 169 genotypes, 70 (41%) didn't show any frost kill, plus additional 17 (10%) had <10% frost kill (Table 4).
- Based on grain yield, days to heading, days to maturity and grain physical appearance, 19 superior genotypes from among the frost tolerant ones were selected to plant in 2015 for further evaluation (Table 4).

Table 4. A set of 169 winter wheat genotypes in the 17th FAWWON-IRR (17th Facultative and Winter Wheat Observation Nursery for Irrigated Environments) evaluated for frost tolerance and agronomic performance in Chimbay, Uzbekistan, 2013-2014.

Entry no.	Entry name / pedigree	Selected for 2015	Frost kill (%)	Plant height (cm)	Grain yield (g m^{-2})	Days to heading	Days to maturity
1	BEZOSTAYA		0	86	664	216	256
3	SULTAN95		0	79	296	219	255
5	KONYA		0	82	652	218	258
6	LOCAL CHECK (Krasnodar 99)		0	79	503	217	257
7	SHARK/F4105W2.1//QT6258 /3/SHARK/F4105W2.1	√	0	85	593	215	256
10	SHARK/F4105W2.1//CHARA/3/MERCAN-1		0	76	394	216	255
12	ALPU//VP5053 (WA#FM/201/23*2/GS50A)		0	86	168	220	256
15	PFAU/WEAVER//KSWGRC39/JGR (OK01421)		0	88	99	218	256
18	POLOVCHANKA/PEHLIVAN	√	0	80	671	213	
19	JCAM/EMU//DOVE/3/JGR/4/THK/5/BOEMA	√	0	85	498	215	
20	POLOVCHANKA/PEHLIVAN	√	0	79	625	216	
21	WEEBILL1/NALIM-3//GALLYA-ARAL1	√	0	76	458	214	
23	JCAM/EMU//DOVE/3/JGR/4/THK/5/BOEMA	√	0	89	672	218	
24	ATTILA//AGRI/NAC/3/ESKINA-8		0	92	520	218	
46	NWT/3/TAST/SPRW//TAW12399.75/6/VEE/TSI//GRK/3/NS55.03/5/C126.15/COFN/3/N10B/P14//P101/4/KRC67		0	85	284	218	254
63	WA476/3/391//NUM/5/W22/5/ANA/6/TAM200/7/85ZHONG56/8/KS82W409/SPN/9/HK1/6/NVSR3/5/BEZ/TVR/5/CFN/BEZ//SU92/CI13645/3NAI60		0	79	304	218	255
83	TOB/ERA//TOB/CNO67/3/PLO/4/VEE#5/5/KAUZ/6/URES/JUN//KAUZ/7/URES/JUN//KAUZ/8/VEE/MJI//2*TUI/3/2*PASTOR CMSA01M00082S-0E		0	90	353	218	255
84	NWT/3/TAST/SPRW//TAW12399.75/6/VEE/TSI//GRK/3/NS55.03/5/C126.15/COFN/3/N10B/P14//P101/4/KRC67 TCI 001504-030YE-030YE-5E -0E	√	0	85	519	217	253
85	CV. NEMCHİNOVSKAYA 24		0	88	503	220	256
88	OSTROV	√	0	85	565	219	257
89	BOEMA		0	91	430	216	256
90	F06325G1-	√	0	92	450	217	255
91	F06325G1-2	√	0	93	473	215	256

92	F06522G1-1	√	0	88	544	214	256
93	F06580G2-1	√	0	85	618	215	255
94	F06659G6-1	√	0	87	447	216	256
95	F06659G10-1	√	0	88	602	214	258
96	F07098G1	√	0	79	782	213	258
97	F07270G2		0	85	675	216	260
98	OK07214	√	0	87	967	216	255
99	OK07218		0	88	715	215	255
100	OK09634	√	0	90	642	217	254
101	BEZOSTAYA		0	85	715	216	255
106	LOCAL CHECK (Krasnodar 99)		0	90	533	218	258
107	LEBED		0	88	577	218	255
108	YUMPA		0	86	613	216	255
109	GROM		0	85	666	215	256
110	NOTA		0	80	638	217	255
111	GASPARD/3/ BATERA//BUC/TO 173		0	79	471	217	256
114	OWL,85224*-3H-*O-HOH/7/T.SPH/2*H567.71//CMH77.93/3/2* CMH79.959/5/T.SPH /2*H567.71 //CMH77.931/3/CMH79.959/4/CMH79.959/6/GASPARD		0	86	518	218	256
115	OWL,85224*-3H-*O-HOH/7/T.SPH/2*H567.71//CMH77.93/3/2* CMH79.959/5/T.SPH /2*H567.71 //CMH77.931/3/CMH79.959/4/CMH79.959/6/GASPARD		0	89	223	217	254
121	ALVD*2/7/VEE/CMH77A.917//VEE/6/CMH79A.955/4/AGA/3/4*SN64/CNO67//INIA66/5/NAC	√	0	86	620	217	255
123	DMITRY		0	90	594	221	258
124	KALYM		0	95	589	218	254
125	MOSKVICH		0	87	440	222	257
126	PROTON		0	88	533	216	255
130	SUL 2		0	90	428	224	259
131	SWW2-95		0	91	377	223	259
133	CIM/BOG12//412	√	0	90	535	222	256
134	SWW1-97		0	87	370	224	258
136	BYRD		0	88	569	217	254
137	CO07 W245		0	90	306	218	254
138	MV-NADOR		0	85	159	215	255

139	MV-PENGO		0	79	274	217	253
141	MV-KOKARDA		0	90	260	219	257
142	HBK0935W-24/KS84W063-9-34-3-2//KARL 92/4/SHARK/F4105W2.1		0	87	310	223	259
143	TAM107//ATAY/GALVEZ87		0	82	294	224	257
144	DULGER-1//VORONA/BAU		0	80	261	223	258
145	ALPU//VP5053 (WA#FM/201/23*2/GS50A)		0	79	374	218	257
147	KS920709-B-5-1-1/4/CHAM6//1D13.1/MLT/3/SHI4414/CROW		0	87	119	218	255
148	SERI.1B*2/3/KAUZ*2/BOW//KAUZ/4/BAGCI2002		0	90	212	217	256
149	TAM200/HBB313E//2158 (OK98697)/5/SITE/MO/4/NAC/TH.AC//3*PVN/3/MIRLO/BUC/6/JGR/CUSTER//JGR* (OK0062278)		0	92	250	217	255
150	TAM200/HBB313E//2158 (OK98697)/5/SITE/MO/4/NAC/TH.AC//3*PVN/3/MIRLO/BUC/6/JGR/CUSTER//JGR* (OK0062278)		0	91	167	216	255
151	ATTILA*2/PBW65//YAKAR		0	90	300	217	254
157	DORADE-5/5/YMH/HYS//HYS/TUR3055/3/DGA/4/VPM/MOS		0	87	259	219	257
158	06579G1-1		0	83	439	218	254
162	AWD99*5725/FL9547		0	84	396	216	254
163	TURKOAZ		0	79	499	217	256
164	KORELI		0	76	477	225	264
166	ATTILA/2*PASTOR//YUMAI 29		0	75	537	217	255
8	ESKINA-10/GRISET-9		10	84	305	217	254
22	WEEBILL1/NALIM-3//GALLYA-ARAL1		10	85	500	217	
26	KS920709-B-5-1-1/BURBOT-4		10	91	182	221	
28	JUP/4/CLLF/3/II14-53/ODIN//CI134431/SEL6425 /WA00477*2 /5/ CROC-1/AE.SQUARROSA (213)//PGO		10	87	333	216	
30	Nalim-3 =BEZ//BEZ/TVR/3/KREMENA//5/LOV29/3/JSW6/LOV13//JSW3/4/ KREME		10	76	346	215	
40	SONMEZ01		10	85	109	217	257
43	JI5418/MARAS//SHARK/F4105W2.1		10	79	321	219	255
49	PYN/BAU/3/AGRI/BJY//VEE		10	80	199	217	255
57	CHATELET/GRU-45		10	85	305	219	257
80	KINACI-97		10	92	553	217	255
103	SULTAN95		10	79	711	221	259
105	KONYA		10	85	432	217	256
129	DB/A 458		10	92	448	218	255
132	SWW1-135		10	92	316	224	258
140	NACIBEY		10	86	300	218	255
153	ATTILA/2*PASTOR//YUMAI 29		10	90	270	218	255

170	SONMEZ01		10	77	310	216	254
58	CHATELET/GRU-45		20	87	247	219	256
86	BETTA		20	86	418	220	257
146	SERI.1B*2/3/KAUZ*2/BOW//KAUZ/4/BURBOT-4/5/BOEMA		20	85	154	223	258
160	OR2071681		20	80	381	224	260
25	KIRGIZ95/8/SABUF/7/ALTAR 84/AE.SQUARROSA (224)//YACO/6/CROC_1/AE.SQUARROSA (205)/5/BR12*3/4/IAS55*4/CI14123/3/IAS55*4/EG,AUS//IAS55*4/ ALD/9/MEZGIT-4		30	90	596	219	
29	ZANDER-8//CRR/ATTILA		30	69	408	216	
71	RANA96/3/RSK/CA8055//CHAM6		30	91	193	218	256
75	4WON-IR-257/5/YMH/HYS//HYS/TUR3055/3/DGA /4/VPM/MOS		30	89	310	219	257
112	RIALTO/ALVAND		30	85	400	216	255
127	KIPRA		30	86	359	217	255
128	KEHLIBAR		30	89	439	217	256
154	SERI.1B*2/3/KAUZ*2/BOW//KAUZ/4/BECUNA-6		30	76	265	218	255
11	MILAN//EJIL/ND 526/3/LE 2302		50	-		219	257
44	4WON-IR-257/5/YMH/HYS//HYS/TUR3055/3/DGA /4/ VPM / MOS		50	-		220	256
61	ID2619/5/GRTPL 6121/6/ID3910066/7/SHARK/F4105W2.1		50	-		219	258
104	KATIA1		50	-	406	218	256
135	SWW1-904		50	-	205	221	256
159	OR2071071		50	-		225	261
52	43-RWA-94N-74/F6038W12.1		60	-		219	257
152	GANSU-1/MEZGIT-4		60	-		220	256
155	KARL//CTK/VEE/3/F1502W9.01/4/STEPHENS		60	-		220	257
165	DI09016		60	-	326	227	265
69	SOLH		70	-		217	254
76	ERYT783-96/SHARK-1		70	-	160	220	256
4	KATIA1		80	-		220	259
9	KS940786-6-7/BONITO-36		80	-		218	256
17	ID800994.W/FALKE//ERYT26221		80	-		217	
31	88ZHONG218//CTK/VEE/3/KVZ/GV//PR/4/KRASNOVODOPADS KAYA25/5/KS82117/MLT		80	-		217	
42	L 3932 K 1-2//GUN91/MNCH		80	-		221	259
68	38IBWSN-208		80	-		218	254
77	TRAP#1/YACO/3/KAUZ*2/TRAP//KAUZ/6/SN64//SKE/2*ANE/3/S X/4/BEZ/5/JUN/7/SHARK-1 TCI 002115 -030YE-030YE-4E-0E		80	-	199	218	256

168	SIETE CERROS93W		80	78		218	257
27	NOVOSADSKA/5/Nalim-3 =BEZ//BEZ/TVR/3/KREMENA/LOV29/4/KATYA1		90	-		215	
50	NE COMP1/5/BEZ//TOB/8156/4/ON/3/TH*6/KF//LEE*6/K/6/ TAST / SPRW../7/ OK81306		90	-		217	254
62	ID2619/5/GRTPL 6121/6/ID3910066/7/SHARK/F4105W2.1		90	-			
70	RSK/CA8055//CHAM6/3/Angi-2		90	-		219	256
87	BETTA-DN		90	-	201	223	260
118	AVD/VEE#1//1-27-6275/CF 1770/3/MV17		90	-			
13	GUN91/4/SNI//CAR422/ANA/3/KAUZ*2/TRAP//KAUZ/5/MERCA N-1		95	-			
37	JI5418/MARAS//NOVOSADSKA		95	-			
51	DORADE-5/DUNAV		95	-		220	256
53	DORADE-5/BEAUBOURG		95	-			
60	DORADE-5/DUNAV		95	-	242		
2	SERI		100	-			
14	JARUMBA/LAMAR-R32//PICAREL-1		100	-			
16	SNI/YACO//BAV92/3/2145		100	-			
32	ZANDER-17/3/KAUZ*2/YACO//KAUZ		100	-			
33	ZANDER-17/OPATA		100	-			
34	TX71A983.4/TX69D4812//PYN/3/VPM/MOS83.11.4.8//PEW/4/GRU -54		100	-			
35	ZANDER-17/3/KAUZ*2/YACO//KAUZ		100	-			
36	1-27-6275/Cf1770//5/Ghods/4/Anza./6/Progress		100	-			
38	DORADE-5/DUNAV		100	-			
39	ZANDER-17/3/KAUZ*2/YACO//KAUZ		100	-			
41	DORADE-5/DUNAV		100	-	-		
45	BLUEGIL-2/CAMPION		100	-			
47	ZANDER-6/6/MNCH/5/BLL/F72.23/4/TLLA//2*FR/K		100	-			
48	PVN/CLI/TAM200/3/SHI4414/CROW//C/4/CADET		100	-			
54	MINA/KRISTAL		100	-			
55	MINA/KRISTAL		100	-			
56	SHARK-6/YUZHNAYA12/7/ID2619/5/GRTPL 6121/6/ID3910066		100	-			
59	GUN91/MNCH//TAM200/KAUZ		100	-			
64	TORIK-15/ROSHAN96		100	-			
65	SHARK-6/YUZHNAYA12/7/ID2619/5/GRTPL 6121/6/ID3910066		100	-			

66	88ZHONG218//CTK/VEE/3/KVZ/GV//PR/4/KRASNOVODOPADS KAYA25/5/KS82117/MLT		100	-			
67	362K2.111/6/NKT/5/TOB/CNO67//TOB/8156/3/CAL//BB/CNO67/4/ TRM/7/TAM200/KAUZ		100	-			
72	C21FAW-IC-BILINMIYEN-1		100	-			
73	C21FAW-IC-BILINMIYEN-2		100	-			
74	C21FAW-IC-BILINMIYEN-3		100	-			
78	PLK/LIRA/5/NAI60/3/14.53/ODIN//[CI13441]/4/GRK79/6/MNCH/7/ CROC_1/AE.SQUARROSA (213)//PGO CMSW01WM00578S		100	-			
79	DAGDAS/APCB-40		100	-			
81	TAM200/KAUZ/4/CHAM6//1D13.1/MLT/3/SHI4414/CROW		100	-			
82	KARL/NIOBRARA//TAM200/KAUZ/3/TAM200/KAUZ		100	-			
102	SERI		100	-	-		
113	ALD'S'/SNB'S'//ZARRIN/3/YACO/2*PARUS		100	-	174		
116	MONARCHA*2/MV17		100	-			
117	MONARCHA*2/MV17		100	-			
119	CHARGER/OWL, 85224*-3H-*0-*HOH		100	-			
120	HYS//DRC*2/7C/3/2*RSH/4/1-12577/5/OPATA*2/WULP		100	-			
122	SHİ≠4414/CROW//ATTİLA		100	-	221		
156	PSK/NAC//SABALAN/3/TAM200/KAUZ		100	-			
161	ALVAND/6/CMH79A.955/4/AGA/3/4*SN64/CNO67//INİA66/5/NA C		100	-			
167	SIETE CERROS66		100	-			
169	SIETE CERROS93S		100	-			

Experiment 4: Performance demonstration of newly released cultivars and pipeline varieties of winter wheat under saline and frost conditions

Objective:

Determine the effect of seeding depth on frost tolerance in winter wheat.

Materials and methods

Location: Chimbay

Number of varieties evaluated: 150 (Table 5)

- Released cultivars and advanced breeding lines adapted to Central Asia.

Experimental design: Alpha lattice, two reps

Depth of seeding : 2 cm and 4 cm

Plot size: 1 m^2, 100 seeds planted

Planting date: 23 September 2013

Characters evaluated: Frost kill (%) determined by seedling count before and after winter season

Results and discussion

- Frost occurred during third week of February when temperatures reached around -25C for several days in Chimbay.
- A large number of lines were tolerant to frost (Table 5)
- A summary of the number of lines showing <10% and <20% frost kill is given below.

Frost kill	Seeding depth	
	2-cm	4-cm
Number of lines with ≤20% frost kill	38 (25%)	97 (65%)
Number of lines with ≤10% frost kill	25 (17%)	75 (50%)

Table 5. Evaluation of commercial varieties and advance breeding lines of winter wheat for frost tolerance in Chimbay, Uzbekistan, 2013-2014

Genotype		Frost kill (%)	
Number	Name / selection number	2 cm seeding depth	4 cm seeding depth
73	20FAWWIR-144	1	1
84	15IWWYTSA-30	2	0
99	20FAWWSA-296	3	0
144	Victoria	4	0
83	15IWWYTSA-29	4	1
145	Kiriya	4	1
2	Tanya	5	1
137	13YTIR-6153	5	3
91	20FAWWSA-249	5	1
72	20FAWWIR-142	5	7
97	20FAWWSA-294	5	2
5	Yaksart	5	2
63	20FAWWIR-38	5	0
100	20FAWWSA-305	6	1
103	13AYTIR-9005	6	2
94	20FAWWSA-291	7	3
1	Krasnodar-99	7	2
3	Muskvich	7	1
44	KR11-9043	8	0
120	13YTIR-6018	9	10
52	20FAWWIR-9	9	2
6	Turkiston	9	0
29	16IWWYT-IR-9838	9	1
35	KR11-40	9	3
4	Sahray	10	0
96	20FAWWSA-293	11	0
8	Bezostaya-1	11	3
7	Yonbosh	11	1
17	16IWWYT-IR-9815	12	3
93	20FAWWSA-283	12	0
116	13AYTIR-9048	14	1
98	20FAWWSA-295	15	1
71	20FAWWIR-139	15	0
75	20FAWWIR-152	17	2
16	16IWWYT-IR-9814	19	6
86	20FAWWSA-215	20	6
40	12Ug99SI-8	20	3
111	13AYTIR-9029	20	2

46	KR11-28	22	1
118	13YTIR-6004	27	6
18	16IWWYT-IR-9816	28	3
125	13YTIR-6055	28	1
88	20FAWWSA-227	29	3
110	13AYTIR-9028	30	1
146	Gozgon	31	4
19	16IWWYT-IR-9817	34	8
147	Elomon	34	6
89	20FAWWSA-229	35	4
106	13AYTIR-9011	36	12
9	Kinaci-97	36	4
50	Shafag-2	38	9
121	13YTIR-6035	39	6
39	KR12-08	41	2
126	13YTIR-6060	45	5
130	13YTIR-6074	46	0
85	20FAWWSA-214	46	5
109	13AYTIR-9026	47	17
95	20FAWWSA-292	48	4
43	KR11-9014	48	11
37	KR12-07	51	11
113	13AYTIR-9042	51	3
77	15IWWYTSA-5	51	4
21	16IWWYT-IR-9822	55	20
36	KR11-9015	56	9
104	13AYTIR-9009	57	14
25	16IWWYT-IR-9829	58	5
12	16IWWYT-IR-9809	58	16
74	20FAWWIR-146	58	1
42	KR11-9015	59	13
70	20FAWWIR-120	61	6
38	KR12-09	61	11
28	16IWWYT-IR-9836	62	10
138	13YTIR-6156	64	14
76	20FAWWIR-158	64	8
87	20FAWWSA-216	65	1
129	13YTIR-6071	67	15
105	13AYTIR-9010	68	9
124	13YTIR-6054	70	18
30	KR11-29	71	6
136	13YTIR-6143	71	11
57	20FAWWIR-23	71	11

108	13AYTIR-9025	73	3
69	20FAWWIR-116	73	6
122	13YTIR-6039	73	13
140	13YTIR-6165	73	12
24	16IWWYT-IR-9825	74	20
114	13AYTIR-9045	74	3
135	13YTIR-6140	77	10
131	13YTIR-6088	78	35
102	13AYTIR-9004	79	13
123	13YTIR-6044	81	17
22	16IWWYT-IR-9823	81	62
117	13YTIR-6003	82	9
132	13YTIR-6101	83	4
23	16IWWYT-IR-9824	83	41
112	13AYTIR-9036	85	17
61	20FAWWIR-30	85	14
115	13AYTIR-9046	90	29
41	12Ug99SI-11	90	45
34	KR12-18	90	12
82	15IWWYTSA-17	90	30
54	20FAWWIR-11	91	78
81	15IWWYTSA-15	92	4
127	13YTIR-6062	93	97
10	16IWWYT-IR-9806	93	34
139	13YTIR-6160	94	73
80	15IWWYTSA-14	94	92
20	16IWWYT-IR-9818	95	63
11	16IWWYT-IR-9807	96	72
149	Farovon	96	62
141	13YTIR-6185	96	95
68	20FAWWIR-88	96	2
31	KR11-20	96	85
142	13YTIR-6189	96	57
79	15IWWYTSA-10	97	57
66	20FAWWIR-81	97	73
133	13YTIR-6105	97	79
27	16IWWYT-IR-9832	97	36
92	20FAWWSA-278	98	29
143	13YTIR-6190	98	94
119	13YTIR-6012	98	80
60	20FAWWIR-26	98	86
78	15IWWYTSA-6	98	95
128	13YTIR-6063	98	41

15	16IWWYT-IR-9812	99	38
26	16IWWYT-IR-9831	99	26
101	13AYTIR-9001	99	69
134	13YTIR-6129	99	95
107	13AYTIR-9019	99	92
13	16IWWYT-IR-9810	100	83
14	16IWWYT-IR-9811	100	96
32	KR11-39	100	100
33	KR12-10	100	95
45	KR11-003	100	96
47	KR11-20	100	84
48	Egana	100	100
49	Layagatli-80	100	50
51	Murob-2	100	100
53	20FAWWIR-10	100	100
55	20FAWWIR-14	100	100
56	20FAWWIR-22	100	30
58	20FAWWIR-24	100	87
59	20FAWWIR-25	100	83
62	20FAWWIR-32	100	95
64	20FAWWIR-50	100	100
65	20FAWWIR-78	100	65
67	20FAWWIR-84	100	84
90	20FAWWSA-235	100	89
148	Barhayot	100	73
150	Shams	100	76
$LSD_{0.05}$		7.1	11.6
CV (%)		6.0	20.0

Experiment 5: Evaluation of newly released and pipeline varieties of winter wheat under saline and frost conditions

Objective:

Demonstrate comparative performance of new and pipeline varieties of winter wheat to provide options of stress tolerant varieties to the wheat growers in Aral Sea region.

Materials and methods

Number of location: 2 (Chimbay and Urgench)

Number of varieties evaluated: 10 (Table 6)

- Five experimental line previously selected for salinity tolerance in Karshi and Urgench, and frost tolerance in Urgench, Uzbekistan under BMZ funded project on salinity tolerant winter wheat for Central Asia
- Five commercial varieties:
  - Krasnodar-99 (widely grown locally)
  - Tanya (widely grown locally)
  - Yongbosh (old check)
  - Yaksart (new variety)
  - Turkiston (new variety)

Experimental design: One replication

Plot size: 50 m^2

Planting date: 23 September 2013

Characters evaluated: frost kill (%), grain yield, days to heading, days to maturity and visual field selection.

Results and discussion

- Frost occurred during third week of February when temperatures reached around -25°C for several days in Chimbay.
- All genotypes were frost tolerant in Chimbay (Table 6).
- The new variety “Yaksart” and pipeline variety “Salinity En-49” yielded higher than both local checks (Krasnodar-99 and Tanya at both locations.
- Farmers’ evaluated the crop in late grain filling stage and ranked new variety “Yaksart” and pipeline variety “Salinity En-49” superior to the local checks.

Table 6. Performance of newly released and pipeline varieties of winter wheat under saline and frost conditions in Chimbay and Urgench, Uzbekistan, 2013-2014

Entry No.	Variety name	Winter kill (%)	Days to heading	Days to maturity	Plant height (cm)	Grain yield (t/ha)		Farmers' preference at late grain filling stage	
						Chimbay	Urgench	Chimbay	Urgench
1	Yaksart	0	213	253	81	4.52	6.53	Rank 2	Rank 2
2	Yongbosh	0	215	256	84	3.60	5.26		
3	Turkistan	0	217	256	85	3.40	6.21		
4	Krasnodar 99 (Local check)	0	214	254	88	4.00	5.27	Rank 3	
5	Tanya (Local check)	0	211	252	86	3.22	5.87		
6	Salinity En-41	0	216	256	90	3.90	5.86		
7	Salinity En-49	0	215	258	88	4.84	6.04	Rank 1	Rank 1
8	Salinity En-65	0	216	258	87	3.10	4.78		
9	Salinity En-144	0	217	259	90	4.00	6.82		Rank 3
10	Salinity En-145	0	216	257	89	2.80	6.17		