大麥在二栽培地區產量穩定性之研究[1]

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摘　　要

本試驗使用13個二稜大麥品種(系)與35個六稜大麥品種(系)栽培於秀水、大安兩個地區，調查十個性狀以估算各性狀之穩定性介量、遺傳率、表現型及遺傳型相關係數，結果如下：

(一)各性狀經變方分析結果顯示：各品種與栽培地區的交感效應均方皆達極顯著水準。

(二)各性狀之表現型相關不論二稜或六稜大麥在兩地區多未達顯著水準，即或達顯著水準者，則一處爲正，一處爲負。但二稜大麥產量和株高、穗重、每穗粒數在兩地區均有正遺傳型相關關係，而六稜大麥產量和穗重、千粒重、容重量間呈正遺傳型相關。

(三)遺傳率估算結果，以抽穗日數與株高有最高的遺傳率。

(四)性狀穩定介值計算結果，二稜大麥中以CI80-754具較高產量及高穩定性。六稜大麥中以CB-15具高產及高穩定性，而CI80-790則具高產且達平均穩定性。

前　　言

本省大麥每年進口三、四十餘萬公噸，其中啤酒用大麥約爲四萬公噸，餘則多做爲飼料，少量做麥片、麥茶等其他用途。由於目前尙無符合釀造啤酒之大麥品種，故現仍進行育種中而推廣則於起步階段。然爲節省外匯及政府照顧農民之德意起見，且大麥在某些地區生育頗佳，大麥仍具有其發展潛力。

新品種之育成，除須注重其遺傳質之影響外，對於環境變異及遺傳基因型與環境間之交感效果亦需同時加以重視，才可獲致高產且可適應於各種不同環境的優良品種。Gulyaer和Berezkin[(13)]謂由於環境影響，性狀之表現在品種間的變異大。Pauw[(17)]等及Meyer[(15)]等亦發現大麥不同品種與環境間有交感作用存在。但Berbigier和Denis[(8)]及Berbigier等[(7)]更進一步指出某些品種和地區間僅有輕微之交感作用，而某些品種和地區間卻有極強之交感作用，一般極早或極晚熟品種有產量不穩定之趨向。Allen等[(5)]更確切指出和所有環境有高度正相關之基因型才是最佳之品種。

大麥由其結穗形態之不同，可分爲二稜大麥(*Hordeum distichnm*)與六稜大麥(*H. vulgare*)，其遺傳質並不相同。故本試驗之目的，擬就二稜品種與六稜品種大麥分別探討其在本省中部兩個地區各性狀間相關關係，遺傳率及其穩定性，以供本省大麥育種與栽培推廣之參考。

材料及方法

(一)供試材料：

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[1] 臺中區農業改良場研究報告第0023號。

[2] 臺中區農業改良場助理研究員。

[3] 本文承中興大學糧食作物研究所曾富生主任斧正，試驗期間又蒙洪財生先生鼎力協助，謹此一併致謝。

二稜大麥計有13品種(系)，六稜大麥計有35品種(系)，詳如表一所示。

表一、供試大麥品種(系)

Table 1. Barley varieties (strains) used in the experiment

Code No.	Two-row barley	Code No.	Six-row barley	Code No.	Six-row barley	Code No.	Six-row barley
1	CI80-111	1	CI80-41	14	CI80-147	27	CI80-564
2	CI80-146	2	CI80-43	15	CI80-164	28	CI80-575
3	CI80-337	3	CI80-45	16	CI80-176	29	CI80-582
4	CI80-370	4	CI80-47	17	CI80-211	30	CI80-589
5	CI80-374	5	CI80-56	18	CI80-214	31	CI80-790
6	CI80-435	6	CI80-57	19	CI80-222	32	B-71
7	CI80-719	7	CI80-58	20	CI80-248	33	CI80-656
8	CI80-726	8	CI80-60	21	CI80-254	34	CB-3
9	CI80-746	9	CI80-112	22	CI80-256	35	CB-15
10	CI80-754	10	CI80-118	23	CI80-259		
11	JB-3	11	CI80-129	24	CI80-494		
12	UNB	12	CI80-141	25	CI80-504		
13	Chung-Hsing No. 2	13	CI80-145	26	CI80-517		

(二)試驗方法：

試驗地點爲彰化縣秀水鄉及臺中縣大安鄉，播種日期分別爲1982年10月26日及11月9日，採完全逢機設計，三重複。於收穫時分別調查以下性狀：抽穗期(heading days)，株高(plant height)，穗長(spike length)，穗重(spike weight)，一平方公尺有效穗數(no. of fertile spike per m^2)，每穗粒數(no. of kernels per spike)，千粒重(1000-kernel weight)，容重量(test weight)，穀粒產量(grain yield)，每穗節數(no. of rachis nodes per spike)。

(三)統計方法：

(1)遺傳率及相關：計算式如下：

變因	自由度	變方	變方成分	共變方	共變方成分
參試	nr-1	$\hat{\sigma} p$		$\hat{\sigma} pij$	
重複	r-1				
品種	n-1	M_1	$\sigma^2 e^+ \sigma^2 g$	N_1	$\sigma eij + r\tau gi$
機差	(r-1)(n-1)	M_2	$\sigma^2 e$	N_2	$j\tau eij$

$$\sigma^2{}_g = (M_1 - M_2)/r$$

$$\sigma^2{}_{gij} = (N_1 - N_2)/r$$

i及j爲任何兩個性狀

表現型相關： $\hat{\sigma}pij/\sqrt{\sigma^2{}_{pi} \cdot \sigma^2{}_{pj}}$

遺傳型相關： $\hat{\sigma}_{gij}/\sqrt{\sigma^2{}_{gi} \cdot \sigma^2{}_{gj}} = \dfrac{\sigma_{pij} - \sigma_{eij}}{\sqrt{(\sigma^2{}_{pi} - \sigma^2{}_{ei})(\sigma^2{}_{pi} - \sigma^2{}_{ej})}}$

遺傳率 $h^2 = \sigma^2{}_g / (\sigma^2{}_g + \sigma^2{}_e)$

(2)以Finlay和Wilknson[12]及Eberhart和Russell[11]之迴歸分析法估算各品種在二個地區下之穩定性介量(Stability parameter)。估算公式要如下：

$$I_j = (\sum_i Y_{ij} / v) - (\sum_i \sum_j Y_{ij} / vn)$$

$$b_i = \sum_i Y_{ij} I_j / \sum_i I_j{}^2$$

$$\Sigma\hat{\sigma}^2 ij = (\sum_j Y^2{}_{ij} - \Sigma^i \overline{Y}_l^2 / n) - (\sum_j Y_{ij} I_j)^2 / \sum_j I_j^2$$

$$S^2{}_{di} = [\sum_j \hat{\sigma}_{ij}^2 / (n-2)] - S_e^2 / r$$

i：品種個數，由1，2，…………v

j：環境個數，由1，2，…………n

Y_{ij}：第i個品種在第j個環境所表現之品種平均值

I_j：環境指數

b_i：迴歸指數

$\Sigma\hat{\sigma}^2{}_{ij}$：第i個品種在所有環境所表現之品種平均值變方的估計值

r：重複次數

$S_e{}^2$：在第j個環境之品種平均值均方

$S_{di}{}^2$：第i個品種其任一穩定性介量估計之偏差

結　　果

(一)變方分析：

調查二稜大麥13品種(系)及六稜大麥35品種(系)之抽穗期，株高、穗長、穗重、一平方公尺有效穗數、每穗粒數、千粒重、容重量、穀粒產量、每穗節數等十個性狀，在秀水、大安兩地區之平均值，分別經變方分析結果如表二所示。除二稜大麥之一平方公尺有效穗數在秀水其品種間未表現顯著差異外，其餘性狀不論二稜或六稜大麥其品種間在兩處均表現出極顯著差異，又將兩地區二稜及六稜大麥之十個性狀進行綜合變方分析，結果如表三所示，除二稜品種之容重量在不同地區未表現出顯著差異外，不論二稜或六稜大麥其十個調查性狀在不同地區不同品種間均表現出極顯著差異，品種與地區之交感作用亦均達極顯著水準。

表二、二稜及六稜大麥十個性狀在二個地區之變方分析

Table 2. Mean square for two-row and six-row barley in 10 characters at two locations

Variety	Location	Source of variation	DF	Heading days	Plant height	Spike length	Spike weight	No. of fertile spike per m^2	No. of kernels per spike	1000-kernel weigth	Test weight	Grain yield	No. of rachis nodes per spike
Two-rowed	Show-Sei	Variety	12	584.52**	707.88**	4.81**	1.45**	6656	41.81**	83.52**	19325**	823938**	95.13**
		Error	26	1.57	15.59	0.11	0.04	3662	7.15	5.00	435	56826	9.90
	Da-Ahan	Variety	12	362.24**	623.21**	2.07**	0.14**	34276**	39.94**	37.73**	11525**	527679**	45.52**
		Error	26	1.49	9.29	0.30	0.06	833	5.97	3.26	521	37411	4.97
Six-rowed	Show-Sei	Variety	34	178.38**	176.40**	2.15**	1.38**	6072**	93.28**	91.04**	4809**	1120794**	61.48**
		Error	70	1.29	8.75	0.09	0.53	2247	22.07	8.04	403	89267	20.40
	Da-Ahan	Variety	34	84.12**	225.85**	2.10**	0.95**	16250**	164.52**	65.05**	6347**	780766**	9.93**
		Error	70	1.43	10.04	0.11	0.05	1132	31.44	14.2	421	74697	2.10

Note: The marks ** and * were significant at 1% and 5% level, respectively.

表三、二稜及六稜大麥十個性狀在二個地區之綜合變方分析

Table 3. Analysis of variance for two-row and six-row barley in 10 characters at two locations

Variety	Source of variation	DF	Heading days	Plant height	Spike length	Spike weight	No. of fertile spike per m^2	No. of kernels per spike	1000-kernel weigth	Test weight	Grain yield	No. of rachis nodes per spike
Two-rowed	Location (L)	1	180.02**	2062.52**	8.61**	7.83**	141228**	175.20**	404.38**	1732	545214**	70.59**
	Variety (V)	12	905.88**	1244.57**	5.37**	1.50**	17249**	53.12**	106.84**	27345**	822203**	82.11**
	LxV	12	41.87**	86.52**	1.50**	0.41**	23181**	27.43**	14.41**	3505**	526084**	58.53**
	Error	50	1.52	12.01	0.20	0.05	4336	8.30	4.09	646	50597	7.42
Six-rowed	Location (L)	1	4510.74**	9288.05**	7.13**	154.17**	40158**	4794.34**	623.33**	6237**	80807101**	431.43**
	Variety (V)	34	210.01**	335.42**	3.32**	1.68**	8260**	124.15**	119.24**	8253**	1378998**	40.93**
	LxV	34	51.84**	65.93**	0.91**	0.65**	13998**	133.70**	36.23**	2904**	522415**	30.60**
	Error	138	1.29	9.19	0.10	0.34	1699	28.17	10.40	407	83021	12.53

Note: The marks ** and * were significant at 1% and 5% level, respectively.

(二)不同地域種植品種間特性之比較。

由表四可知二稜與六稜大麥在不同地區表現之農藝性狀平均值，兩者比較言，二稜品種其抽穗日數較早，株高較高，穗長較長，一平方公尺有效穗數稍高，千粒重，容重量較大，每穗節數較多，但產量較低，穗重與每穗粒數亦均較低。

表四、二稜及六稜大麥十個農藝性狀在二個地區之平均值

Table 4. The mean of 10 characters for two-row and six-row barley at two locations

Variety	Location	Heading days	Plant height (cm)	Spike length (cm)	Spike weight (gm)	No. of fertile spike per m^2	No. of kernels per spike	1000-kernel weigth (gm)	Test weight (gm/l)	Grain yield (kg/ha)	No. of rachis nodes per spike
Two-rowed	Show-Sei	78.2	96.8	8.23	2.38	369.7	23.3	41.6	502.4	1161	23.8
	Da-Ahan	81.2	86.5	7.57	1.75	277.3	20.3	37.0	509.5	994	25.7
	Mean	79.7	91.6	7.90	2.07	323.5	21.8	39.3	505.9	1078	24.8
Six-rowed	Show-Sei	70.1	87.2	7.02	4.21	301.0	41.1	35.8	473.5	2561	23.3
	Da-Ahan	79.3	73.9	6.65	2.52	339.8	31.6	32.4	463.1	1319	20.4
	Mean	74.7	80.6	6.84	3.37	319.9	36.3	34.1	468.3	1940	21.9

(三)遺傳率之估計：

利用變方分析結果，估算各性狀之遺傳變方(σ_g^2)與表現型變方σ_o^2)，以求廣義之遺傳率(h^2)，結果如表五所示。以抽穗日數之遺傳率最高，二處均達95%以上，其次爲株高，均達85%以上，二稜品種之遺傳率，以抽穗日數>株高>容重量>產量、穗長>千粒重>穗重>每穗節數>一平公尺有效穗數>每穗粒數。六稜品種之遺傳率，以抽穗日數>株高>穗長>容重量>產量>千粒重>穗重>一平方公尺有效穗數>每穗粒數>每穗節數，兩品種有類似之變化。

表五、二稜及六稜大麥六個性狀在二個地區之遺傳率

Table 5. Heritability values (%) for two-row and six-row barley in ten characters at two locations

Variety	Location	Heading days	Plant height (cm)	Spike length (cm)	Spike weight (gm)	No. of fertile spike per m^2	No. of kernels per spike	1000-kernel weigth (gm)	Test weight (gm/l)	Grain yield (kg/ha)	No. of rachis nodes per spike
Two-rowed	Show-Sei	99.2	93.7	93.4	91.9	37.6	57.1	84.0	93.5	81.1	74.2
	Da-Ahan	98.8	95.7	69.2	67.3	93.0	65.5	77.9	87.5	81.4	73.1
	Mean	99.0	94.7	81.3	79.6	65.3	61.3	81.0	90.5	81.3	73.7
Six-rowed	Show-Sei	97.9	86.5	87.7	34.2	35.2	51.8	80.4	78.5	79.5	40.4
	Da-Ahan	95.1	87.8	84.9	85.8	81.6	58.5	54.4	82.4	75.9	55.9
	Mean	96.5	87.2	86.3	60.0	58.4	55.3	67.4	80.5	77.7	48.2

(四)性狀間之相關關係：

以變方及變積分析，估計調查的十個性狀間之遺傳型相關與表現型相關，結果如表六-a~d所示。不論品種或地區，一般言之，遺傳型相關效果均高於表現型相關。二稜大麥表現型相關在秀水、大安均未達顯著水準；而在兩處均表現遺傳正相關之性狀計有：株高與穗長，每穗粒數、容重量、穀粒產量間，穗長與容重量間，穗重與千粒重、穀粒產量間，每穗粒數與穀粒產量、每穗節數間。六稜大麥千粒重與一平方公尺有效穗數間，每穗節數與每穗粒數間，其表現型相關在兩處均達顯著水準，但於秀水爲負於大安爲正；在秀水、大安均表現出遺傳正相關之性狀計有：穗長與每穗節數間，穗重與每穗粒數、千粒重、穀粒產量間，千粒重與穀粒產量間，容重量與穀粒產量間。

表六-a、二稜大麥十個性狀在秀水地區之表現型及遺傳型相關係數

Table 6-a. Phenotypic and genotypic correlations between all pairs of ten characters for two-row barley at Show-Sei

Character		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Heading days	(A)		0.5643	0.4250	–0.4075	–0.0876	0.1958	–0.2700	0.4400	0.0527	0.1106
Plant height	(B)	0.0485		0.5790	0.0318	–0.1501	0.5362	0.2151	0.5594	0.5139	0.1521
Spike length	(C)	–0.4086	–0.0015		0.2142	0.0919	0.6816	0.2274	0.6476	0.4228	0.0979
Spike weight	(D)	0.2654	–0.5094*	–0.3043		–0.1791	0.4053	0.6494	0.3808	0.7168	–0.2646
No. of fertile spike per m^2	(E)	0.2713	0.1631	–0.4593*	0.1483		0.0687	0.5626	–0.3483	–0.5569	0.0872
No. of kernels per spike	(F)	0.3248	–0.1248	0.1057	0.2632	–0.2303		0.1649	0.4097	0.7075	0.4943
1000-kernel weight	(G)	–0.2453	0.0523	–0.2874	–0.0008	–0.1148	–0.1469		0.2594	0.2838	–0.3760
Test weight	(H)	–0.0224	–0.1388	0.2196	0.0398	0.0073	–0.0450	–0.0003		0.6443	–0.3701
Grain yield	(I)	–0.2054	0.0327	0.2826	–0.0253	–0.1701	–0.0391	0.2297	0.2235		–0.0705
No. of rachis nodes per spike	(J)	0.3097	–0.2002	0.3316	–0.1675	–0.2407	0.3716	–0.6072**	–0.0004	–0.0082	

Note: 1. The marks ** and * were significant at 1% and 5% level, respectively.

2. Phenotypic and genotypic correlations were on left and right of diagonal, respectively.

表六-b、二稜大麥十個性狀在大安地區之表現型及遺傳型相關係數

Table 6-b. Phenotypic and genotypic correlations between all pairs of ten characters for two-row barley at Da-Ahan

Character		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Heading days	(A)		0.2440	–0.1762	–0.1011	0.6554	0.0833	0.0249	0.1949	0.1396	0.4846
Plant height	(B)	0.1411		0.5860	0.2767	–0.3058	0.6849	0.5544	0.5175	0.5683	0.6689
Spike length	(C)	–0.2338	–0.2538		0.5327	–0.0038	0.2517	0.4382	0.5660	0.2611	0.1919
Spike weight	(D)	–0.1875	–0.1250	0.3722		–0.0147	0.7046	0.7689	0.5133	0.6408	0.3546
No. of fertile spike per m^2	(E)	–0.3911	0.0716	0.1120	–0.1251		–0.3883	–0.1952	0.1984	–0.2650	–0.1415
No. of kernels per spike	(F)	–0.2441	–0.2346	0.6239**	0.4861*	–0.0421		0.6012	0.5505	0.6889	0.6908
1000-kernel weight	(G)	0.2211	0.2187	0.1600	–0.1455	–0.0226	–0.0978		0.5417	0.7955	0.5066
Test weight	(H)	–0.4578*	–0.2097	0.2130	0.4903*	–0.0112	0.2139	0.3282		0.2893	0.5792
Grain yield	(I)	0.2401	0.3352	0.3029	0.0044	–0.0572	0.1698	–0.0888	0.1405		0.4760
No. of rachis nodes per spike	(J)	–0.5259*	0.0888	0.3554	0.3746	0.6376**	0.3926	–0.2185	0.0678	–0.1452	

Note: 1. The marks ** & * were significant at 1% and 5% level, respectively.

2. Phenotypic and genotypic correlations are on left and right of diagonal, respectively.

表六-c、六稜大麥十個性狀在秀水地區之表現型及遺傳型相關係數

Table 6-c. Phenotypic and genotypic correlations between all pairs of ten characters for six-row barley at Show-Sei

Character		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Heading days	(A)		0.3281	–0.0143	–0.1842	0.2217	0.1763	–0.2123	0.1329	–0.0477	–0.1435
Plant height	(B)	–0.1728		0.0884	–0.0413	0.0905	0.2646	–0.1351	0.0652	0.0873	–0.0681
Spike length	(C)	–0.1683	0.1593		–0.0607	–0.3126	–0.0803	0.2163	0.1268	–0.0288	0.4823
Spike weight	(D)	–0.0042	–0.0629	0.0640		–0.0087	0.5473	0.7054	0.2156	0.5815	–0.1392
No. of fertile spike per m^2	(E)	0.2151	0.0234	–0.0078	0.2603		0.2915	–0.0241	–0.2826	0.0793	–0.1254
No. of kernels per spike	(F)	–0.1225	0.0693	0.3212*	0.3005*	–0.1375		0.3292	0.3973	0.3596	–0.3630
1000-kernel weight	(G)	0.0341	–0.1210	0.1338	0.0396	–0.4305**	0.1407		0.3489	0.3618	–0.0532
Test weight	(H)	–0.1901	0.1523	0.0040	0.2694	–0.1825	0.1879	0.0099		0.5162	–0.2830
Grain yield	(I)	0.1214	0.1506	–0.0201	0.2204	–0.0995	0.1287	0.0886	0.4405**		–0.2233
No. of rachis nodes per spike	(J)	0.2228	0.1046	0.0492	0.1845	0.2628	–0.3003*	–0.2120	0.1195	0.0727	

Note: 1. The marks ** and * were significant at 1% and 5% level, respectively.

2.Phenotypic and genotypic correlations are on left and right of diagonal, respectively.

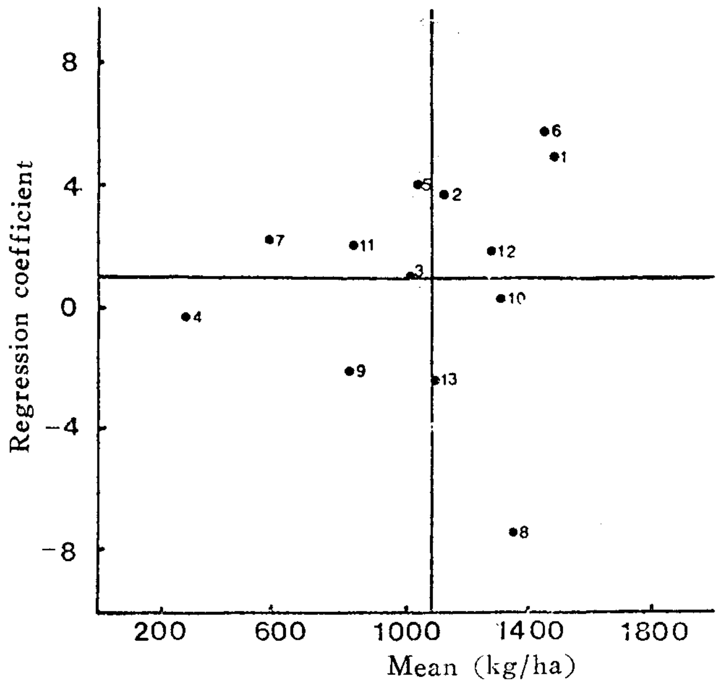
表六-d、六稜大麥十個性狀在大安地區之表現型及遺傳型相關係數
Table 6-d. Phenotypic and genotypic correlations between all pairs of ten character for six-row barley at Da-Ahan

Character		(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)
Heading days	(A)		–0.2333	0.0593	–0.3403	0.2513	–0.3185	0.0700	0.2119	–0.2751	–0.1214
Plant height	(B)	0.0180		0.6283	–0.1107	–0.4638	–0.1533	–0.0068	0.1927	0.3048	0.4348
Spike length	(C)	–0.2309	0.0755		–0.0476	–0.1346	–0.3739	0.2601	0.2936	0.0282	0.4809
Spike weight	(D)	–0.2520	0.0162	0.2039		–0.0965	0.6754	0.4822	0.2397	0.3842	–0.1193
No. of fertile spike per m^2	(E)	0.0481	0.3483**	–0.1503	–0.0154		–0.2110	–0.2757	–0.1684	–0.5128	0.1911
No. of kernels per spike	(F)	0.0443	0.0351	–0.0125	0.1807	–0.0061		0.0712	0.1970	0.2764	–0.1709
1000-kernel weight	(G)	0.0546	0.1262	0.1381	0.1220	0.5160**	0.0115		0.2393	0.3319	–0.1877
Test weight	(H)	–0.2123	–0.0919	0.1708	0.2233	0.0205	0.0727	0.4438**		0.3914	–0.0981
weight Grain yield	(I)	–0.0890	–0.0256	–0.0927	0.3134	0.1231	0.2714	0.1139	0.3527**		–0.3934
No. of rachis nodes per spike	(J)	0.1377	0.3001*	0.2304	0.2736	0.1055	0.3867**	0.1041	0.0452	0.1835	

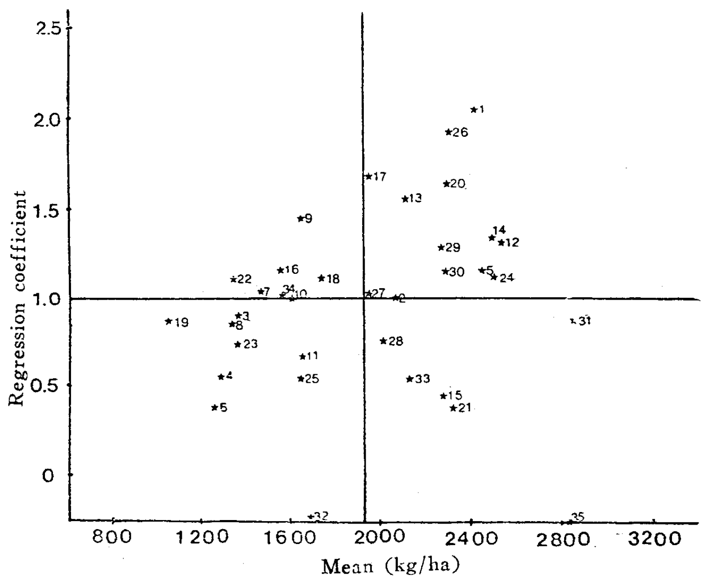
Note: 1. The marks ** and * were significant at 1% and 5% level, respectively.
2.Phenotypic and genotypic correlations were on left and right of diagonal, respectively.

(五)穩定性分析

以Finlay和Wilkirson及Eberhart和Russell[1]之穩定性分析法，分別估算二稜與六稜大麥在兩個地區至收穫其各性狀之穩定性介量(Satbility parameter)。穩定性指兩種以上不同的遺傳型(即不同品種)在二種以上不同的環境時，因環境的不同，使不同的遺傳型對環境的反應產生差異，此種相對間的差異，稱之穩定性。假設給環境以某一種指標，而求品種對這些指標迴歸係數，以迴歸係數b值，表示品種對環境指標的估值，即以b值來表示品種的穩定性。b=1.0表示此品種具有平均穩定性，在各種環境反應相同。b>1表示此品種對環境變化敏感，不具穩定性。0<b<1表示此品種對環境變化鈍感，具有高度穩定性。二稜與六稜大麥穀粒產量平均值與迴歸係數之關係，以圖一-a~b所示。由圖一-a可知二稜大麥各品種(系)之平均穀粒產量與迴歸係數間無正相關關係存在，一般言之，二稜品種之穩定性較六稜品種爲低，在13品種(系)中僅以CI80-754具較高產量及高穩定性。六稜大麥之結果則如圖一-b所示，其穀粒產量與迴歸係數間亦無明顯之正相關關係，其穩定性較二稜品種爲高，35品種(系)中，以CB-15具高產高穩定性，而CB80-790則具高產且達平均穩定性。



圖一-a、二稜大麥穀粒產量平均與迴歸係數之關係。
Fig. 1-a. The relationship between regression coefficients and mlan gain zields of two-row barley.



圖一-b、二稜大麥穀粒產量平均與迴歸係數之關係。
Fig. 1-b. The relationship between regression coefficients and mlan gain zields of six-row barley.

討　　論

就育種學立場言之，須同時注意遺傳基因型，環境及二者間之交感效果，尤其是當新品系育成之際，需經過若干年代的中級、高級、區域等之比較試驗，以檢定新品系之區域適應力及其生產力，以決定其推廣價值，育成之優良品系能適應於各種不同的地域環境且均能獲致高產，亦即具有高度穩定力及高度生產力的品種才是育種之終極目標。

民國70年菸酒公賣局表示自國外採購大麥已感困難，希望能在省內生產所需之啤酒大麥種子，但限於二稜品種，又由於蛋白質含量等之限制，使得本省大麥無法順利推展，故目前首要工作爲育成真正符合釀造啤酒品質且適應各地之大麥品種。

Roger等[21]認爲產量除受粒數影響外，尙受分蘗數、粒重之影響。Bretschneider-Herrmann和Malesevic[10]則指出大麥穗之光合作用決定產量，而且莖及分蘗對產量之貢獻較葉部爲大。Nikitrov和Chepelev[17]亦指出決定產量主要性狀計有粒重、有效分蘗，但Wegrzyn和Poradzinska[22]表示產量和粒數、千粒重有最大相關存在。Puri等[19]進一步指出大麥性狀間之表現型相關不穩定，粒重與產量間有顯著相關關係。本試驗有類似結果，二稜大麥以株高、粒重、粒數較重要，六稜大麥以穗重、千粒重、容重量較重要，但其遺傳影響大於環境影響，Rishi和Jagdamba[20]謂株高與產量，穗長間呈正遺傳型相關，和本試驗二稜大麥結果相同，又謂穗長和產量、粒數間呈正遺傳型和表現型相關，和本試驗結果不同。

Rishi和Jagdamba[20]發現大麥其粒數與穗長之遺傳率最高，Kovacevic[15]則謂大麥遺傳率，以穗長>株高>粒重>千粒重。Andonov[17]表示以千粒重遺傳率最高，粒數、粒重有高遺傳率。和本試驗有不儘相同之結果。故就本試驗結果，在秀水、大安兩地區，二稜品種欲獲高產，應選株高較高，穗重較大，粒數較多之品種，但粒數受環境影響較穗重爲大，而以株高之遺傳率最高。六稜大麥欲得高產品種，應選穗重、千粒重、容重量較大之品種，但其均受環境某種程度之影響，故其早期選拔效果較低。

Pauw等[18]謂環境與品種間有交感作用存在，而Meyer[16]則指出大部分性狀其品種與環境間有交感作用存在。和本試驗結果相同。但由穩定性介量之分析可指示明確之育種方向，以獲致高產且穩定性高之優良品種。二稜品種中以CI80-754較具發展潛力，而六稜品種中則以CB-15與CI80-790表現最佳。

由於大麥釀造啤酒品質中，蛋白質含量爲最重要之一項，需在11%以下。Gorshkova和Gorodov[13]謂大麥產量和蛋白質呈負相關，而Rishi和Jagdamba[20]更指出二者呈負遺傳相關，故選拔高產且蛋白質含量低之品種並非不可能，但其他如栽培技術，地區與蛋白質含量間關係之探討，亦值得加以重視。

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Studies on Yield Stability of Barley in Two Locations[1]

Ai-Na Hsu[2]

ABSTRACT

Ten characters in 13 varieties (strains) of two-row barley and 35 varieties (strains) of six-row barley at Show-sei and Da-Ahan were investigated for studving their stability parameters, heritability, and phenotypic/genotypic correlation coefficients among various characters. Results were summarized as follows:

(1) From the analysis of variance for ten characters, it was found that the inter-actions between varieties and cultural environment were highly significant.

(2) Phenotypic correlation at two locations wasn't significant or had the contrast (positive and negative) significance. Grain yield was significantly positive correlated with plant height, spike weight and number of kernel per spike for two-row barley at two locations. The spike weight, 1000-kernel weight and test weight for six-row barely were also significantly positive related to grain yield.

(3) High heritabilities (99.0, 94.7 for two-row barley and 96.5, 87,2 for six-row barley respectively) were obtained in characters of days to heading and plant height.

(4) Through Finlay and Eberhart's stability analysis, it indicated that CI 81-754 of two-row barley, CB-15 and CI80-790 of six-row barley were more stable and had high yield.

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