‘Pacific Gold’
Condiment Oriental Mustard
(*Brassica juncea* L.)

Morphology and Crop Quality

Pacific Gold is most morphologically similar to the oriental mustard cultivar ‘Cutlass’. Morphology of these two cultivars was compared in replicated field trials from 1996 to 2002 (a total of 18 site/years). Both cultivars flower as similar times (Table 1). Pacific Gold is, however, significantly taller than those of Cutlass ($P<0.01$) (Table 2). In addition, oil content of Pacific Gold (35.0%) was significantly higher than Cutlass (33.6%) (Table 3), and seed size of Pacific Gold is significantly larger than Cutlass (Table 4)

The primary quality characteristic difference between Pacific Gold and Cutlass is in seed meal glucosinolate content (Table 5). Glucosinolate content in condiment mustard is directly related to pungency and a high pungency is required for a ‘*hotter*’ tasting product which is desired in Pacific Rim countries. Total glucosinolate content in Pacific Gold seed is significantly higher (303 µmol g^{-1} of defatted seed meal) than Cutlass (216 µmol g^{-1} of defatted seed meal). Primary glucosinolate in Pacific Gold is 2-propenyl glucosinolate, accounting for over 99% of the total glucosinolate content.

Agronomic Performance Trials

Pacific Gold was evaluated in replicated field trials grown throughout the dryland agricultural regions of northern Idaho and eastern Washington between 1996 and 2002. Performance of Pacific Gold was compared to the Canadian cultivars Cutlass and ‘Lethbridge.22A’. These control cultivars represent the majority of the Canadian oriental mustard acreage and predominant in this mustard class worldwide. Pacific Gold is the first condiment oriental mustard (*B. juncea*) to be developed for the Pacific Northwest region and no local cultivars are available for comparison. Trial results from 1999 through 2002 were obtained from the Pacific Northwest Mustard Variety Trials.

Plants of Pacific Gold emerge quickly after planting and crop establishment is rapid. Plants are mature on average 105 days after planting. Pacific Gold is highly resistant to lodging and seed shatter at maturity. Pacific Gold is moderately resistant to cabbage flea beetle (*Phyllotreta cruciferae* (*Phyllotreta cruciferae* (Goeze) (Coleoptera: Chrysomelidae)) and cabbage seedpod weevil (*Ceutorhynchus assimilis* Paykull), and diamondback moth (*Plutella xylostella* L.).

Seed yield potential of Pacific Gold in the inland Pacific Northwest region is excellent. When planted under conventional tillage systems, Pacific Gold average seed yield over 38 sites/years was 1,974 kg ha^{-1}, which was significantly higher than Cutlass (1,795 kg ha^{-1}) and

Lethbridge 22A (1,698 kg ha $^{-1}$) (Table 6). Yield potential of Pacific Gold when planted in a direct seed system was lower at 1,583 kg ha $^{-1}$, over 36 year/sites, but was significantly higher under these situations than either Cutlass or Lethbridge 22A (1,471 and 1,378 kg ha $^{-1}$, respectively) (Table 7). Pacific Gold was entered into the Pacific Northwest Mustard Variety Trial between 1999 and 2002, over the 55 site/years of this trial; Pacific Gold was the highest yielding entry at 44 locations (i.e. over 82% of the sites tested).

Table 1. Days from planting to 50% flower bloom of 'Pacific Gold' and two control cultivars ('Cutlass' and 'Lethbridge 22A') evaluated from replicated field trials conducted between 1996 and 2002.

Cultivar	Weighted Mean	Rank	2002 (4 sites)	2001 (3 sites)	2000 (3 sites)	1999 (3 sites)	1998 (2 sites)	1997 (2 sites)	1996 (2 sites)
	-days-		days						
Pacific Gold	53.9	1	52.3	55.4	54.1	53.2	55.3	55.0	54.2
Cutlass	53.4	2	50.9	55.7	53.1	52.0	56.7	54.6	52.7
LSD 5%	0.67	-	0.76	n.s.	0.52	0.74	n.s.	n.s.	0.69

n.s. non-significant difference between cultivars.

Table 2. Plant height after flower ending of 'Pacific Gold' and two control cultivars ('Cutlass' and 'Lethbridge 22A') evaluated from replicated field trials conducted between 1996 and 2002.

Cultivar	Weighted Mean	Rank	2002 (4 sites)	2001 (3 sites)	2000 (3 sites)	1999 (3 sites)	1998 (2 sites)	1997 (2 sites)	1996 (1 sites)
	- cm -		cm						
Pacific Gold	149.9	1	141	148	162	141	155	164	135
Cutlass	145.7	2	140	143	160	138	149	153	135
LSD 5%	3.96	-	n.s.	n.s.	2.42	2.11	3.64	4.13	n.s.

n.s. non-significant difference between cultivars.

Table 3. Seed oil content of 'Pacific Gold' and two control cultivars ('Cutlass' and 'Lethbridge 22A') evaluated from replicated field trials conducted between 1999 and 2001.

Cultivar	Grand mean	Rank	2001				2000		1999	
			Mosc	Gene	Lewi	Zenn	Gene	Zenn	Mosc	Lewi
	- % -		%							
Pacific Gold	35.0	1	37.6	38.9	30.3	34.5	37.7	33.9	35.7	31.2
Cutlass	33.6	3	36.1	37.9	29.5	35.6	36.2	31.9	32.2	29.1
LSD 5%	1.09		0.91	0.70	n.s.	n.s.	1.70	2.31	1.52	0.82

n.s. non-significant difference between cultivars.

Table 4. 1000 seed weight 'Pacific Gold and two control cultivars ('Cutlass' and 'Lethbridge 22A') evaluated from replicated field trials conducted at two locations in 2000, 2001 and 2002.

Cultivar	Grand mean	Rank	2002		2001		2000	
			Mosc	Gene	Gene	Zenn	Mosc	Gene
	-g/1000-		------------------------- g/1000 seed --------------------------					
Pacific Gold	2.602	1	2.100	2.613	2.517	2.472	2.774	3.134
Cutlass	2.498	2	2.243	2.478	2.412	2.266	2.612	2.975
LSD 5%	0.503		0.317	0.504	0.788	0.251	0.352	0.444

Table 5. Seed meal glucosinolate profile and total glucosinolate content of 'Pacific Gold' and 'Cutlass' based on 50 seed samples.

	Glucosinolate profile† and content						
Cutivar	Allyl	But	Pent	Hybut	Hypent	Phen	Total
	------------------- µmoles/gram of oil-free meal -------------------------						
Pacific Gold	300.9	1.3	0.1	0.1	0.3	0.2	302.9
Cutlass	213.7	1.0	0.1	0.1	0.3	1.1	216.4
LSD 5%	9.75	0.56	0.00	0.00	0.01	0.05	12.34

† Allyl = 2-propenyl glucosinolate; But = 3-butenyl glucosinolate; Pent = 4-pentenyl glucosinolate; Hybut = 2-hydroxy-3-butenyl glucosinolate; Hypent = 2-hydroxy-4-pentenyl glucosinolate; Phen = 2

Table 6. Seed yield of 'Pacific Gold' and two control cultivars ('Cutlass' and 'Lethbridge 22A') evaluated from replicated field trials conducted on conventionally tilled soil between 1996 and 2002.

Cultivar	Weighted Mean	Rank	2002 (7 sites)	2001 (8 sites)	2000 (8 sites)	1999 (9 sites)	1998 (2 sites)	1997 (2 sites)	1996 (2 sites)
	-kg/ha-		----------------------------			kg ha $^{-1}$			----------------------------
Pacific Gold	1974	1	1499	2182	1833	2114	1749	3802	2128
Cutlass	1795	2	1159	2017	1686	1907	1571	3603	1980
Leth. 22A	1698	3	1023	1818	1658	1911	1408	3454	2164
Grand mean	1822		1227	2006	1725	1977	1576	3620	2091
LSD 5%	208		296	431	261	201	265	345	310

Table 7. Seed yield of 'Pacific Gold' and two control cultivars ('Cutlass' and 'Lethbridge 22A') evaluated from replicated field trials conducted under direct seeding systems between 1999 and 2002.

Cultivar	Weighted Mean	Rank	2002 (5 sites)	2001 (6 sites)	2000 (6 sites)	1999 (7 sites)
	-kg/ha-		--------------------------	kg ha $^{-1}$		--------------------------
Pacific Gold	1583	1	1290	1717	1555	1700
Cutlass	1471	2	1096	1460	1537	1692
Leth. 22A	1378	3	1002	1395	1451	1570
Grand mean	1477	-	1129	1523	1514	1654
LSD 5%	102	-	154	304	n.s.	180

n.s. non-significant difference between cultivars.