

# CURRICULUM VITAE

## PATRICK M. HAYES

Professor of Crop and Soil Science  
Oregon State University  
Crop Science 253  
(541) 737-5878  
patrick.m.hayes@orst.edu

### EDUCATION

B.S.	University of Arizona	Agronomy	1980
M.S.	Oregon State University	Plant Breeding	1982
Ph.D.	University of Minnesota	Plant Breeding	1986

### EMPLOYMENT

Professor	Dept. of Crop and Soil Science, Oregon State University	1996 - present
Associate Dept. Head	Dept. of Crop and Soil Science, Oregon State University	2000- present
Director, International Degree Program	Office of International Education, Oregon State University	1999
Associate Professor	Oregon State University	1991 - 1996
Assistant Professor	Oregon State University	1986 - 1991
Research Assistant	University of Minnesota	1983 - 1986
Research Assistant	Oregon State University	1980 - 1982
Translator	Arizona State Museum	1977 - 1980
Trainee	International Maize and Wheat Improvement Center	1976

### CURRENT ASSIGNMENT

**Research:** Barley genetics and breeding: 0.80 FTE

**Resident Instruction:** CSS430/530 – Plant Genetics; CSS630 – Current Topics in Plant Breeding; Graduate student advising, Undergraduate mentor; 0.15 FTE

**Administration:** Associate Department Head, Crops Unit (November, 2000 - present); 0.05 FTE

### Grants funded (past four years)

Year	Agency	Title	Personnel	Amount	Status
2001	National Science Foundation	Transposon-mediated functional genomics	P. Lemaux (PI) P. Hayes (co-PI) (OSU portion of 1,532,663)	347,874	4 yrs
2001	National Science Foundation	Low temperature regulons	M. Thomashow (PI) P. Hayes (co-PI) (OSU portion of 5,072,963)	578,559	5 yrs
2001	CSREES Special Grants; Industry	North American Barley Genome Mapping Project	Patrick Hayes	65,021	1 yr.
2002	AMBA	Winter malting barley	Patrick Hayes	60,000	5 yr.
2002	USDA/NRI	Barley stripe rust resistance genetics	P. Hayes	294,000	3 yrs
2002	Oregon Grains Commission	Barley variety development	Chris Mundt Patrick Hayes	20,000	1 yr.
2002	Busch Ag. Res.	Winter malting barley	Patrick Hayes	38,000	1 yr.

2002	Great Western	Winter malting barley	Patrick Hayes	18,000	1 yr.
2002	CSREES Special Grants	North American Barley Genome Mapping Project	Patrick Hayes (OSU portion of 710,875)	73,537	1 yr.
2003	CSREES Special Grants	North American Barley Genome Mapping Project	Patrick Hayes (OSU portion of 710,875)	51,800	1 yr.
2003	Busch Ag. Res.	Winter malting barley	Patrick Hayes	39,000	1 yr.
2003	Great Western	Winter malting barley	Patrick Hayes	18,000	1 yr.
2003	Oregon Grains Commission	Coordinated barley variety development	Patrick Hayes (OSU portion of 20,000)	6,666	1 yr.
2003	OSU Agric. Res. Foundation	Barley straw for algae control	Patrick Hayes Russ Meints	10,000	1 yr.
2004	Busch Ag. Res.	Winter malting barley	Patrick Hayes	39,000	1 yr.
2004	Anheuser Busch	Winter malting barley	Patrick Hayes	18,000	1 yr.
2004	CSREES Special Grants	North American Barley Genome Mapping Project	Patrick Hayes (OSU portion of 631,469)	47,469	1 yr.
2004	Oregon Grains Commission	Coordinated barley variety development	Patrick Hayes	5,000	1 yr.
2004	OSU Agric. Res. Foundation	Barley straw for algae control: phase II	Patrick Hayes	10,000	1 yr.
2005	American Malting Barley Assoc.	Winter malting barley	Patrick Hayes	25,100	1 y.
2005	Anheuser Busch	Winter malting barley	Patrick Hayes	18,000	1 yr.
2005	Busch Ag. Res.	Winter malting barley	Patrick Hayes	39,000	1 yr.
2005	Sprout/Oregon Garden	Barley straw for algae control	Patrick Hayes	15,000	1 yr.
2005	Idaho Barley Commission	Barley Improvement	Patrick Hayes	2,000	1 yr.
2005	Oregon Grains Commission	Winter waxy barley	Patrick Hayes	25,000	1 yr.
2006	USDA/CSREES	Barley CAP	Gary Muelbauer (PI) (OSU portion of 5,000,000)	530,807	5 yrs

## Refereed Publications

### Journal articles (past four years)

1. Sato, K. T. Inukai, and P. M. Hayes. 2001. QTL analysis of resistance to the rice blast pathogen in barley (*Hordeum vulgare*). *Theor. Appl. Genet.* 102:916-920.
2. Van Sanford, D., J. Anderson, K. Campbell, J. Costa, P. Cregan, C. Griffey, P.M. Hayes, and R. Ward. 2001. Discovery and development of molecular markers linked to Fusarium Head Blight resistance: an integrated system for wheat and barley. *Crop Sci.* 638-644.
3. Karsai, I., K. Meszaros, L. Lang, P.M. Hayes, and Z. Bedo. 2001. Multivariate analysis of traits determining adaptation in cultivated barley. *Plant Breeding* 120:217-222.
4. Marquez-Cedillo, L.A., P.M. Hayes, A. Kleinhofs, W.G. Legge, B.G. Rossnagel, K. Sato, S.E. Ullrich, D.M. Wesenberg, and the NABGMP. 2001. QTL analysis of agronomic traits in barley based on the doubled haploid progeny of two elite North American varieties representing different germplasm groups. *Theor. Appl. Genet.* 103:625-637.
5. Costa, J.M., S. Kramer, C. Jobet, R. Wolfe, A. Kleinhofs, D. Kudrna, A. Corey, S. McCoy, O. Riera-Lizarazu, K. Sato, T. Toojinda, I. Vales, P. Szucs, and P. M. Hayes. 2001. Molecular mapping of the Oregon Wolfe Barleys: an exceptionally polymorphic doubled-haploid population. *Theor. Appl. Genet.* 103:415-424.
6. Igartua, E., P.M. Hayes, W.T.B. Thomas, R. Meyer, and D.E. Mather. 2002. Genetic control of quantitative grain and malt quality traits in barley. *Journal of Crop Production.* 5: 131-164.

7. Börner, A., G. Buck-Sorlin, P.M. Hayes, S. Malyshev, and V. Korzun. 2002. Molecular mapping of major genes and quantitative trait loci determining flowering time in response to photoperiod in barley. *Plant Breeding* 12: 129-132.
8. Castro, A. X. Chen, P. M. Hayes, S. J. Knapp, R. F. Line, T. Toojinda, and H. Vivar. 2002. Coincident QTL determine seedling and adult plant resistance to stripe rust in barley. *Crop Science*. 42:1701-1708.
9. Matus, I. and P.M. Hayes. 2002. Genetic diversity in three groups of barley germplasm assessed by Simple Sequence Repeats. *Genome*. 45:1095-1106.
10. Chen, H., S. Wang, Y. Xing, C. Xu, P.M. Hayes, and Q. Zhang. 2003. Comparative analyses of genomic locations and specificities of loci for quantitative resistance to *Pyricularia grisea* in rice and barley. *PNAS (USA)*. 100:2544-2549
11. Castro, A. X. Chen, P. M. Hayes, and M. Johnston. 2003. Pyramiding quantitative trait locus (QTL) alleles determining resistance to barley stripe rust: effects on resistance at the seedling stage. *Crop Sci*. 43: 651-659.
12. Chang, Y. J. von Zitzewitz, P.M. Hayes, and T.H.H. Chen. 2003. High frequency plant regeneration from immature embryos of an elite barley cultivar (*Hordeum vulgare* L. cv. Morex). *Plant Cell Reports*. 733-738.
13. Castro, A. F. Capettini, A. Corey, T. Filichkia, P.M. Hayes, A. Kleinhofs, D. Kudrna, K. Richardson, S. Sandoval-Islas, C. Rossi, and H. Vivar. 2003. Mapping and pyramiding of qualitative and quantitative resistance to stripe rust in barley. *Theor. Appl. Genet.* 107:922-930.
14. Clark, S.E., P.M. Hayes, and C. Henson. 2003. Effects of single nucleotide polymorphisms in Beta-amylase 1 alleles from barley on functional properties of the enzymes. *Plant Phys. and Biochem.* 41:798-804.
15. Matus, I., A. Corey, T. Filichkin, P. M. Hayes, J. Kling, W. Powell, O. Riera-Lizarazu, K. Sato, M.I. Vales, and R. Waugh. 2003. Development and characterization of recombinant chromosome substitution lines (RCSLs) using *Hordeum vulgare* subsp. *spontaneum* as a source of donor alleles in a *Hordeum vulgare* subsp. *vulgare* background. *Genome*. 46:1010-1023.
16. Castro, A. X. Chen, A.E. Corey, T. Filichkina, P. M. Hayes, C. Mundt, K. Richardson, S. Sandoval-Islas, and H. Vivar. 2003. Pyramiding and validation of Quantitative Trait Locus (QTL) alleles determining resistance to barley stripe rust: effects on adult plant resistance. *Crop Sci*. 43:2234-2239.
17. Francia, E., F. Rizza, L. Cattivelli, A.M. Stanca, G. Galiba, B. Tóth, P.M. Hayes, J.S. Skinner, N. Pecchioni. 2004. Two loci on chromosome 5H determine low temperature tolerance in the new 'winter' x 'spring' ('Nure' x 'Tremois') barley map. *Theor. Appl. Genet.* 108: 670-680.
18. Cooper, L., L. Marquez-Cedillo, J. Singh, A. K. Sturbaum, S. Zhang, V. Edwards, K. Johnson, A. Kleinhofs, S. Rangel, V. Carollo, P. Bregitzer, P. G. Lemaux, and P. M. Hayes. 2004. Mapping Ds insertions in barley using a sequence-based approach. *Mol Gen Genomics* (2004) 272: 181–193.
19. Karsai, I., P. M. Hayes, J. Kling, I. A. Matus, K. Meszaros, L. Lang, Z. Bedo, and K. Sato. 2004. Genetic variation in component traits of heading date in *Hordeum vulgare* subsp. *spontaneum* accessions characterized in controlled environments. *Crop Sci*. 44:1622–1632
20. Fu, D., P. Szűcs, L. Yan, M. Helguera, J.S. Skinner, J. von Zitzewitz, P. M. Hayes, and J. Dubcovsky. 2005. Large deletions within the *VRN-1* first intron are associated with spring growth habit in barley and wheat. *Mol. Gen. Genomics*. *In press*
21. Karsai, I., P. Szűcs, K. Meszaros, T. Filichkin P. M. Hayes, L. Lang, and Z. Bedo. 2005. The *Vrn-H2* locus is a major determinant of flowering time in a facultative x winter growth habit barley (*Hordeum vulgare* L.) mapping population. *Theor. Appl. Genet.* *In press*.
22. Clark, S.S., P. M. Hayes, and C. A. Henson. 2005. Characterization of barley tissue-ubiquitous  $\beta$ -amylase2 and effects of the single nucleotide polymorphisms on the enzyme's thermostability. *Crop Sci.* *In press*

23. Bilgic, H., B. Steffenson, and P.M. Hayes. 2005. Comprehensive genetic analyses reveal differential expression of seedling and adult plant resistance to spot blotch in populations of barley. *Theor. Appl. Genet. In press*
24. Yan, L., J. von Zitzewitz, J. Skinner, P.M. Hayes, and J. Dubcovsky. 2005. Molecular characterization of the duplicated meristem identity genes *HvAP1a* and *HvAP1b* in barley. *Genome. In press*
25. von Zitzewitz, J., P. Szűcs, J. Dubcovsky, L. Yan, E. Francia, N. Pecchioni, A. Casas, T.H.H. Chen, P. M. Hayes, and J. Skinner. 2005. Structural and functional characterization of barley vernalization genes. *Plant Mol. Bio. In press*
26. Vales, M.I., C. C. Schön, F. Capettini, X. M. Chen, A. E. Corey, D. E. Mather, C. C. Mundt, K. L. Richardson, J. S. Sandoval-Islas, H. F. Utz, and P. M. Hayes. 2005. Effect of population size on the estimation of QTL: A test using resistance to barley stripe rust. *Theor. Appl. Genet. In press.*
27. Skinner J.S., J. von Zitzewitz, P. Szűcs, L. Marquez-Cedillo, T. Filichkin, K. Amundsen, E. Stockinger, M.F. Thomashow, THH Chen, and P.M. Hayes. 2005. Structural, Functional, and Phylogenetic Characterization of a Large CBF Gene Family in Barley. *Plant Molecular Biology. In press*
28. Yun, S-Y., L. Gyenis, P.M. Hayes, I. Matus, K.P. Smith, B.J. Steffenson and G.J. Muehlbauer. 2005. Quantitative trait loci for multiple disease resistance in wild barley. *Crop Sci. In press.*

### **Germplasm registrations**

1. Wesenberg, D.M., D.E. Burrup, W.M. Brown, V.R. Velasco, J.P. Hill, J.C. Whitmore, R.S. Karow, P.M. Hayes, S.E. Ullrich, and C.T. Liu. 2001. Registration of Bancroft barley. *Crop Sci.* 41:265-266.
2. Ullrich, S.E., C.E. Muir, V.A. Jitkov, J.W. Burns, P.E. Reisenauer, D.M. Wesenberg, R.F. Line, X. Chen, C.T. Liu, L.D. Robertson, R.S. Karow, and P.M. Hayes. 2002. Registration of Farmington barley. *Crop Sci.* 42: 2209-2210.
3. Blake, T., J. Bowman, P. Hensleigh, G. Kushnak, G. Carlson, L. Welty, E. Eckhoff, K. Kephart, D. Wichman, and P. Hayes. 2002. Registration of Valier barley. *Crop Sci.* 42: 1748-1749.
4. Hayes, P.M., A.E. Corey, C. Mundt, T. Toojinda, and H. Vivar. 2003. Registration of Tango barley. *Crop Sci.*: 43: 729-731.
5. Ullrich, S., V. Jitkov, K. Muir, J. Burns, P. Reisenauer, R. Line, X. Chen, B. Jones, D. Wesenberg, L. Robertson, and P. Hayes. 2003. Registration of Bob barley. *Crop Sci.*43:1132-1134.

### **Book Chapters**

1. P.M. Hayes, A. Castro, L. Marquez-Cedillo, A. Corey, C. Henson, B.L. Jones, J. Kling, D. Mather, I. Matus, C. Rossi, and K. Sato. 2003. Genetic Diversity for Quantitatively Inherited Agronomic and Malting Quality Traits. *In* R. Von Bothmer, H. Knapfner, T. van Hintum, and K. Sato (ed.). *Diversity in Barley*. Elsevier Science Publishers, Amsterdam.
2. P.M. Hayes, A. Corey, and J. DeNoma. Doubled haploid production in barley, using the *Hordeum bulbosum* technique. 2003. *In* M. Maluszynski, K. Kasha, and B.P. Forster. (ed). *Doubled haploid production in crop plants: a manual*. FAO/IAEA (Vienna).
3. Skinner, J.S., von Zitzewitz, J, Marquez-Cedillo, L, Filichkin, T, Szűcs, P, Amundsen, K, Stockinger, EJ, Thomashow, MF, Chen, THH, and Hayes, PM (2005) Barley Contains a Large CBF Gene Family Associated with Quantitative Cold Tolerance Traits. *In*: THH Chen, M Uemura, and S Fujikawa, (eds.), *Advances in Plant Cold Hardiness: Molecular Genetics and Transgenics*. CAB International, Oxon, UK. (In press)
4. Cooper LLD, von Zitzewitz J, Skinner JS, Szűcs P, Karsai I, Francia E, Stanca AM, Pecchioni N, Laurie DA, Chen THH, Hayes PM (2005) The genetic basis of vernalization responses in barley. *In*: Chen THH, Uemura M, Fujikawa S (eds) *Cold Hardiness in Plants: Molecular Genetics, Cell Biology and Physiology*. CAB International, Oxon, UK, pp 64-75

### **Electronic media**

[www.barleyworld.org](http://www.barleyworld.org)