

Dulal Borthakur
College of Tropical Agriculture and Human Resources
 Department of Molecular Biosciences and Bioengineering
 FTE Distribution: 50% Administration, 25% I; 25% R

Education

Degree	University	Major
Bachelors	Assam Agricultural University, Jorhat, India	Agriculture
Masters	Punjab Agricultural University, Ludhiana, India	Plant Breeding
PhD	John Innes Institute, University of East Anglia, Norwich, U.K.	Molecular Biology

Professional Appointments

Title	Employer	Dates employed
Professor	Department of Molecular Biosciences and Bioengineering, University of Hawaii at Manoa, Honolulu	7/20000 to present
Associate Professor	Department of Plant Molecular Physiology, University of Hawaii at Manoa, Honolulu	7/2000 to 6/2000
Assistant Professor	Department of Plant Molecular Physiology, University of Hawaii at Manoa, Honolulu	4/1994 to 6/ 1996
Assistant Researcher	Biotechnology Program, University of Hawaii at Manoa, Honolulu	5/1989 to 3/1994
Postdoctoral Research Associate	Department of Molecular Genetics and Cell Biology, University of Chicago	11/1986 to 5/1989

Courses Taught

Course Number and Title (credits)

Biol 401/MBBE 401 Molecular Biotechnology (3 cr) Spring semester every year

MBBE 408 /Biol 408 Molecular Cell Biology (3 cr) Spring semester every year

MBBE/Micro 601 Molecular Cell Biology (3 cr) Fall semester in even number years

MBBE/Micr 602 Molecular Biology and Genetics (3 cr) Fall semester in odd number years

Publications (reverse chronological order)

Refereed Journal Publications

Rodrigues-Corrêa KCS, Honda MDH, Borthakur D, Fett-Neto AG (2019) Mimosine accumulation in *Leucaena leucocephala* in response to stress signaling molecules and acute UV exposure. Plant Phys Biochem. 135: 432-440

Honda MDH, Ishihara KL, Pham DT, Borthakur D. (2019). Genes highly expressed in the foliage of giant leucaena (*Leucaena leucocephala* subsp. *glabrata*). Plant Biosyst. DOI: 10.1080/11263504.2019.1578283.

- Honda MDH, Borthakur D (2019). Mimosine content of *Leucaena leucocephala* under various environmental conditions. Trop Grasslands-Forrales Tropicales. 7: 164-172.
- Bageel A, Honda MDH, Carrillo JT, Borthakur D (2019) Giant leucaena (*Leucaena leucocephala* subsp. *glabrata*): a versatile tree-legume for sustainable agroforestry. Agroforestry Systems. <https://doi.org/10.1007/s10457-019-00392-6>
- Honda MDH, Ishihara KL, Pham DT, Borthakur (2018) Identification of drought-induced genes in giant leucaena (*Leucaena leucocephala* subsp. *glabrata*). Trees 32(2): 571-585. <https://doi.org/10.1007/s00468-018-1657-4>
- Ishihara KL, Corpuz M, Morden CW, Borthakur D (2017) Botany, ecology, and diversity of *Acacia koa* in the Hawaiian Islands. Am J Agric Biol Sci 12 (2): 66-78. DOI: 10.3844/ajabssp.2017.66.78
- Ishihara K, Lee EKW and Borthakur D (2017) Thigmomorphogenesis: changes in morphology, biochemistry, and levels of transcription in response to mechanical stress in *Acacia koa*. Can. J. For. Res. 47: 583–593 [dx.doi.org/10.1139/cjfr-2016-0356](https://doi.org/10.1139/cjfr-2016-0356)
- Negi, VS, Borthakur D (2016) Heterologous expression and characterization of mimosinase from *Leucaena leucocephala*. Methods in Molecular Biology 1405:59-77. doi: 10.1007/978-1-4939-3393-8_7.
- Ishihara KL, Honda MDH, Pham DT, Borthakur D (2016) Transcriptome analysis of *Leucaena leucocephala* and identification of highly expressed genes in roots and shoots. Transcriptomics 4:135. doi:10.4172/2329-8936.1000135
- Negi, VS, Borthakur D (2016) Heterologous expression and characterization of mimosinase from *Leucaena leucocephala*. Methods in Molecular Biology 1405:59-77. doi: 10.1007/978-1-4939-3393-8_7.
- Ishihara K, Lee EKW and Borthakur D (2016) An improved method for RNA extraction from woody legume species *Acacia koa* and *Leucaena leucocephala*. International Journal of Forestry and Wood Sci. 2: 031-037
- Dudley NS, Jones TC, James RL, Snieszko RA, Cannon P, and Borthakur D (2015) Applied disease screening and selection program for resistance to vascular wilt in Hawaiian *Acacia koa*, Southern Forests: a Journal of Forest Science, 77: 65-73, DOI: 10.2989/20702620.2015.1007263
- Pal A, and Borthakur D (2016) Transgenic overexpression of *Leucaena* β -carbonic anhydrases in tobacco does not affect carbon assimilation and overall biomass. Plant Biosystems 5: 932-941. DOI:10.1080/11263504.2014.993739
- Ishihara K, Lee EW, Rushanaedy I, and Borthakur D (2015). Illumina-based de novo transcriptome analysis and identifications of genes involved in the monolignol biosynthesis pathway in *Acacia koa*. American Journal of Bioinformatics, 4(1): 7-27. doi: 10.3844/ajbsp.2015.7.27 Open Access.
- Negi VS, Bingham J-P, Li QX, Borthakur D (2014) A carbon-nitrogen lyase from *Leucaena leucocephala* catalyzes the first step of mimosine degradation. (Plant Physiology 164: 922-934 (Published online before print on December 2013, doi: [http:// dx. doi. org/10. 1104/ pp. 113. 230870](http://dx.doi.org/10.1104/pp.113.230870)) Open Access.
- Yafuso JT, Negi VS, Bingham J-P, Borthakur D (2014) An O-acetylserine (thiol) lyase from *Leucaena leucocephala* is a cysteine synthase but not a mimosine synthase. Applied Biochemistry and Biotechnology 173:1157–1168 DOI: 10.1007/s12010-014-0917-z
- Pal A, Borthakur D (2014) Tissue-specific differential expression of two β -carbonic anhydrases in *Leucaena leucocephala* under abiotic stress conditions. J Appl Biotechnol 2: 43-64
- Negi VS, Bingham J-P, Li QX, Borthakur D (2013) *midD*-encoded ‘rhizomimosinase’ from *Rhizobium* sp. strain TAL1145 is a C–N lyase that catabolizes L-mimosine into 3-hydroxy-4-pyridone, pyruvate and ammonia. Amino Acids 44(6):1537-47. DOI 10.1007/s00726-013-1479-z.

- Adamski DJ, Dudley NS, Morden CW, Borthakur D (2013) Cross-amplification of non-native *Acacia* species in the Hawaiian Islands using microsatellite markers from *Acacia koa*. *Plant Biosystems* 146: 24–32. DOI: 10.1080/11263504.2012.749958.
- Pal A, Negi VS, Khanal S, Borthakur D (2012) Immunodetection of curcumin in seed meal of *Jatropha curcas* using polyclonal antibody developed against curcumin-L. *Current Nutrition & Food Science* 8: 213–219.
- Rushanaedy I, Jones TC, Dudley NS, Liao RJF, Agbayani R, Borthakur D (2012) Chitinase is a potential molecular biomarker for detecting resistance to *Fusarium oxysporum* in *Acacia koa*. *Tropical Plant Biol.* 5:244–252. DOI 10.1007/s12042-012-9108-7.
- Adamski DJ, Dudley NS, Morden CW, Borthakur D (2012) Genetic differentiation and diversity of *Acacia koa* populations in the Hawaiian Islands. *Plant Species Biology*. 27: 181–190 (with cover page photo from our work) DOI: 10.1111/j.1442-1984.2011.00359.x
- Pal A, Negi VS, Borthakur D (2012) Efficient in vitro regeneration of *Leucaena leucocephala* using immature zygotic embryos as explants. *Agroforestry Systems* 84:131–140 (DOI 10.1007/s10457-011-9438-8).
- Negi VS, Pal A, Singh R, Borthakur D (2011) Identification of species-specific genes from *Leucaena leucocephala* using interspecies suppression subtractive hybridization. *Annals of applied Biology* 159: 387–398 (doi:10.1111/j.1744-7348.2011.00506.x).
- Walton CB, Jube S, Schlemmer A, Patek PQ, Zimmerman DH, Rosenthal KS, Borthakur D (2010) *Ex vivo* stimulation assay for T-cell responses for tuberculosis using LEAPS-peptide heteroconjugates. *Current Trends in Microbiology* 6:1–12.
- Jube SLR, Borthakur D (2010) Transgenic *Leucaena leucocephala* expressing the *Rhizobium* gene *pydA* encoding a meta-cleavage dioxygenase shows reduced mimosine content. *Plant Physiol Biochem* 48 (2010) 273–278
- Jube S, Awaya J, Borthakur D (2009) Expression of *Rhizobium pydA-pydB* fusion gene in *Nicotiana tabacum* confers resistance to the toxic aromatic compound 3-hydroxy-4-pyridone. *Biologia Plantarum* 53 (2): 355–359, 2009
- Jube S, Borthakur D (2009) Development of an *Agrobacterium*-mediated transformation protocol for the recalcitrant tree-legume *Leucaena leucocephala* using immature zygotic embryos. *Plant Cell, Tissue and Organ Culture (PCTOC): Journal of Plant Biotechnology* 96: 325–333.
- Fredua-Agyeman R, Adamski D, Liao RJ, Morden C, Borthakur D (2008) Development and characterization of microsatellite markers for analysis of population differentiation in the tree legume *Acacia koa* (Fabaceae: Mimosoideae) in the Hawaiian Islands. *Genome* 51: 1001–1015.
- Walton CB, Inos ABH, Andres OA, Jube S, de Couet HG, Douglas JT, Patek PQ, Borthakur D (2008) Immunization with hybrid recombinant *Mycobacterium tuberculosis* H₃₇Rv proteins increases the T_H1 cytokine response in mice following a pulmonary instillation of irradiated mycobacteria. *Vaccine* 26 26,4396–4402.
- Kutin RK, Jenkins DM, Borthakur D (2008) Characterization of a *Corynebacterium* strain that can reduce nitrate from high strength nitrate medium. *Bioremediation Journal*. 12(3):168–172.
- Awaya JD, Tittabutr P, Li QX, Borthakur D (2008) Pyruvate carboxylase is involved in metabolism of mimosine by *Rhizobium* sp. strain TAL1145. *Archives of Microbiology*190: 409–415. DOI:10.1007/s00203-008-0384-4.
- Tittabutr P, Awaya JD, Li QX, Borthakur D (2008) The cloned 1-aminocyclopropane-1-carboxylate (ACC) deaminase gene from *Sinorhizobium* sp. strain BL3 in *Rhizobium* sp. strain TAL1145 promotes

nodulation and growth of *Leucaena leucocephala*. Systematic and Applied Microbiology 31:141-150.

Jube S, Borthakur D (2007) Expression of bacterial genes in transgenic tobacco: methods, applications and future prospects. Electronic J Biotechnol. 10 (3): 452-467. DOI: 10.2225/vol10-issue3-fulltext-4 <http://www.ejbiotechnology.info/content/vol10/issue3/full/4/4.pdf>

Awaya JD, Walton C, Borthakur D (2007) The *pydA-pydB* gene produces an active dioxygenase-hydrolase that degrades 3-hydroxy-4-pyridone, an intermediate of mimosine metabolism. Appl. Microbiol. Biotechnol 75(3):583-588. DOI 10.1007/s00253-007-0858-3

Tittabutr P, Payakapong W, Teaumroong N, Boonkerd N, Singleton PW, Borthakur D (2006) The alternative sigma factor RpoH2 is required for salt tolerance in *Sinorhizobium* sp. strain BL3. Res Microbiol.157: 811-818.

Leary JK, Singleton PW, Scowcroft PG, Borthakur D (2006) Symbiotic diversity in the cosmopolitan genus *Acacia*. Symbiosis 41 (3): 107-117

Payakapong W, Tittabutr P, Teaumroong N, Boonkerd N, Singleton PW, Borthakur D (2006) Identification of two clusters of genes involved in salt tolerance in *Sinorhizobium* sp. strain BL3. Symbiosis 41: 47-51

Tittabutr P, Payakapong W, Teaumroong N, Boonkerd N, Singleton PW, Borthakur D (2006) A histidine kinase sensor protein gene is necessary for induction of low pH tolerance in *Sinorhizobium* sp. strain BL3. Antonie Van Leeuwenhoek 89 (1): 125-134 (Online: December 8, 2005; DOI: 10.1007/s10482-005-9015-0)

Leary JK, Hue NV, Singleton PW, D. Borthakur (2006) Soil acidification, nutrient depletion, and symbiotic nitrogen fixation are the major features of gorse (*Ulex europaeus*) infestation on volcanic soils in Hawaii. Biol. Fertility Soils. 42:215-223. Published online: 28 June 2005

Awaya JD, Fox PM, Borthakur D (2005) *pyd* genes of *Rhizobium* sp. strain TAL1145 are required for degradation of 3-hydroxy-4-pyridone, an aromatic intermediate in mimosine metabolism. J. Bacteriol. 187 (13): 4480-4487.

Kaufusi PH, Forsberg LS, Tittabutr P, and Borthakur D (2004) Regulation of exopolysaccharide synthesis in *Rhizobium* sp. strain TAL1145 involves an alternative sigma factor gene, *rpoH2*. Microbiology 150: 3473-3482.

Leary JK, Singleton PW and Borthakur D (2004) Canopy nodulation of the endemic tree legume *Acacia koa* in the mesic forests of Hawaii. Ecology 85:3151-3157.

Jin H-J, Dunn MA, Borthakur D, and Kim YS (2004) Refolding and purification of unprocessed porcine myostatin. Protein Expression and Purification 35:1-10.

Borthakur D, Soedarjo, Fox PM, and Webb DT (2003) The *mid* genes of *Rhizobium* sp. strain TAL1145 are required for degradation of mimosine into 3-hydroxy-4-pyridone and are inducible by mimosine. Microbiology 149: 537-546.

Awaya J, Fox PM and Borthakur D (2003) Genes encoding a fructose-1,6-bisphosphate aldolase and a fructose-1,6-bisphosphatase are present within the gene cluster for mimosine degradation in *Rhizobium* sp. strain TAL1145. Plant Soil 257: 11-18.

Saafi H and Borthakur D (2002) In vitro plantlet regeneration from cotyledon of the tree legume *Leucaena leucocephala*. Plant Growth Regulation 38:279-285.

You S, Marutani M and Borthakur D (2002) Diversity among *Bradyrhizobium* isolates nodulating Yardlong Bean and Sunhemp in Guam. J. Appl. Microbiol. 93(4):577-84.

Abaidoo RC, Keyser HH, Singleton PW and Borthakur D (2002) Comparison of molecular and antibiotic resistance profile methods for the population analysis of *Bradyrhizobium* spp. (TGx) isolates that

- nodulate the new TGx soybean cultivars in Africa. *J. Appl. Microbiol.* 92(1):109-17.
- Fox PM and Borthakur D. (2001) Selection of several classes of mimosine-degradation-defective Tn3Hogus-insertion mutants of *Rhizobium* sp. strain TAL1145 on the basis of mimosine-inducible GUS activity. *Can J. Microbiol.* 47: 488-494.
- Shigaki T, Gabriel DW, Patil SS, Borthakur D, Choi JH and Alvarez A. (2001) Blight-associated epitope and DNA fragment from *Xanthomonas capestris* pv *capestris* are not required for blight. *Plant Biology* 3: 106-112.
- Jin R-G, Liu Y-B, Tabashnik BE and Borthakur D. (2000) Development of transgenic cabbage (*Brassica oleracea* var. *capitata*) for insect resistance by *Agrobacterium tumefaciens*-mediated transformation. *In Vitro Cellular Dev Biol Plant* 36(4): 231-237.
- Abaidoo R, Keyser H, Singleton PW, and Borthakur D (2000) *Bradyrhizobium* spp. (TGx) Isolates nodulating the new soybean cultivars in Africa are diverse and distinct from bradyrhizobia that nodulate North American soybeans. *Int. J. Syst. Evol. Microbiol.* 50:225-234.
- Jin R-G., Liu Y-B, Tabashnik BE and Borthakur D. (1999) Tissue culture and *Agrobacterium*-mediated transformation of watercress. *Plant Cell, Tissue and Organ Culture* 58:171-176.
- Marutani M, Richardson J, Edirveerasingam V, Taitano D and Borthakur D (1999) Indigenous *Rhizobium* strains from Guam contain a mimosine-degrading gene. *Micronesia* 31:379-385.
- Yang J, Du N, Carpenter JS, and Borthakur D (1999) PCR detection of the pyridinediol-degrading ruminal bacterium, *Synergistes jonesii*, in the rumen fluid of cattle. *Symbiosis* 26: 25-38.
- You Z Gao X, Ho MM, and Borthakur D (1998) A stomatin-like protein encoded by the *slp* gene of *Rhizobium etli* is required for nodulation competitiveness on the common bean. *Microbiology* 144: 2619 - 2627
- Gubili J and Borthakur D (1998) Organization of the *hupDEAB* genes within the hydrogenase gene cluster of *Anabaena* sp. strain PCC7120. *J. Appl. Phycol.* 10: 163-167.
- Soedarjo M, and Borthakur D (1998) Mimosine, a toxin produced by the tree-legume *Leucaena* provides a nodulation competition advantage to mimosine-degrading *Rhizobium* strains. *Soil Biol. Biochem.* 30: 1605-1613.
- Parveen N, Webb DT and Borthakur D (1997) The symbiotic phenotypes of exopolysaccharide-defective mutants of *Rhizobium* sp. strain TAL1145 do not differ on determinate- and indeterminate-nodulating tree legumes. *Microbiology* 143: 1959-1967.
- Gubili J and Borthakur D (1996) The use of a PCR cloning and screening strategy to identify lambda clones containing the *hupB* gene of *Anabaena* sp. strain PCC7120. *J. Microbiol. Methods* 27: 175-182.
- Soedarjo M, and Borthakur D (1996) Mimosine produced by the tree-legume *Leucaena* provides growth advantages to some *Rhizobium* strains that utilize it as a source of carbon and nitrogen. *Plant and Soil* 186: 87-92
- Soedarjo M, and Borthakur D (1996b) Simple procedures to remove mimosine from young leaves, pods and seeds of *Leucaena leucocephala* used as food. *Int. J. Food Sci. Technol.* 31: 97-103
- Borthakur D and Gao X (1996) A 150-Mda plasmid in *Rhizobium etli* strain TAL182 contains genes for nodulation competitiveness on *Phaseolus vulgaris* L. *Can J. Microbiol.* 42: 903-910.
- Tabashnik BE, Malvar T, Liu Y-B, Finson N, Borthakur D, Shin B-S, Park S-H, Masson L, Maagd RA, and Bosch D (1996) *Bacillus thuringiensis* toxins: cross-resistance in diamondback moth and amino acid sequence similarity. *Appl Env Microbiol.* 62: 2839-2644.
- Parveen N, Webb DT, and Borthakur D (1996) *Leucaena leucocephala* nodules formed by a surface

- polysaccharide defective mutant of *Rhizobium* sp. strain TAL1145. *Mol. Plant-Microbe Interact.* 9: 364-372
- Gao, X and Borthakur, D. (1995) Discrete differences between strains of different *Rhizobium* spp. for competitive nodule occupancy on beans. *World J. Microbiol. Biotechnol.* 11: 681-682.
- Tragut V, Xiao J, Bylina E, and Borthakur D (1995) Characterization of DNA restriction-modification systems in *Spirulina platensis* strain pacifica. *J. Appl. Phycol.* 7 : 561-564.
- Pooyan S, George MLC, and Borthakur D. (1994) Isolation and characterization of a gene for nodule development linked to the *ndvA* and *ndvB* genes in *Rhizobium* sp. strain TAL1145. *Symbiosis* 17: 201-205.
- Soedarjo M, Hemscheidt TK, and Borthakur D (1994) Mimosine, a toxin present in the tree legume *Leucaena*, induces a mimosine-degrading enzyme activity in some strains of *Rhizobium*. *Appl. Env. Microbiol.* 60: 4268-4272
- George MLC, Young JPW, and Borthakur D. (1994) Genetic characterization of *Rhizobium* sp. strain TAL1145 that nodulates tree legumes. *Canadian J. Microbiol.* 40: 208-215.
- Mimmack ML, Borthakur D, Jones MA, Downie JA, and Johnston AWB (1994) The *psi* operon of *Rhizobium leguminosarum* biovar phaseoli : identification of two genes whose products are located at the bacterial cell surface. *Microbiology* 140: 1223 - 1229
- Parveen N and Borthakur D (1994) Construction of a single-transposon mutant in *Rhizobium* sp. strain TAL1145 from a double-insertion mutant. *Lett. Appl. Microbiol.* 19: 142-145.
- Pooyan S, George MLC, and Borthakur D. (1994) Characterization of a *Rhizobium etli* chromosomal gene required for nodule development on *Phaseolus vulgaris* L. *World J. Microbiol. Biotechnol.* 10: 583-589
- George MLC, Robert FM, and Borthakur D (1992) Genetic analysis of *Rhizobium leguminosarum* bv. *phaseoli* mutants defective in nodulation and nodulation suppression. *Appl. Env. Microbiol.* 58 :1050-1053
- Latchford JW, Borthakur D, and Johnston AWB (1991) The products of *Rhizobium* genes, *psi* and *pss*, which affect exopolysaccharide production, are associated with the bacterial cell surface. *Mol. Microbiol.* 5:2107-2114
- Borthakur D, Basche M, Buikema WJ, Borthakur P and Haselkorn R (1990) Expression, nucleotide sequence and mutational analysis of two heterocyst-specific genes in *Anabaena* sp. strain PCC 7120. *Mol. Gen. Genet.* 221:227-234.
- Borthakur D and Haselkorn R (1989) Nucleotide sequence of the gene encoding 33 kDa water oxidizing polypeptide of *Anabaena* sp. strain PCC 7120. *Plant Mol. Biol.* 13:427-439
- Borthakur D and Haselkorn R (1989) Tn5 mutagenesis of *Anabaena* sp. strain PCC 7120: isolation of a new mutant unable to grow without combined nitrogen. *J. Bacteriol.* 171:5759-5761
- Borthakur D Latchford JW, Barker R and Johnston AWB (1988) Analysis of *pss* genes of *Rhizobium leguminosarum* required for exopolysaccharide (EPS) synthesis and nodulation of peas; their primary structure and their interaction with *psi* and other nodulation genes. *Mol. gen. Genet.* 213:155-162.
- Borthakur D and Johnston AWB (1987) Analysis of *psi*, a gene on symbiotic plasmid of *Rhizobium phaseoli*, which inhibits exopolysaccharide synthesis and nodulation: determination of its sequence and demonstration that its transcription is inhibited by *psr*, another gene on the symbiotic plasmid. *Mol. Gen. Genet.* 207:149-154
- Borthakur D, Lamb JW, Johnston AWB (1987) Identification of two classes of *Rhizobium phaseoli* genes

required for melanin synthesis: one of which is required for nitrogen fixation and activates transcription of the other. *Mol. Gen. genet.* 207: 155-160.

Borthakur D, Barber CE, Lamb JW, Daniels MJ, Downie JA and Johnston AWB (1986) A mutation that blocks exopolysaccharide synthesis prevents nodulation of peas by *Rhizobium leguminosarum* but not of beans by *R. phaseoli* and is corrected by cloned DNA from *Rhizobium* or the phytopathogen *Xanthomonas*. *Mol. Gen Genet.* 203: 320-323.

Borthakur D, Downie JA, Johnston AWB and Lamb JW (1985) *psi* plasmid-linked *Rhizobium phaseoli* gene that inhibits exopolysaccharide production and which is required for symbiotic nitrogen fixation. *Mol. Gen. Genet.* 200: 278-282.

Book Chapters

Ishihara KL, Honda MDH, Bageel A, Borthakur D (2018) *Leucaena leucocephala*: a leguminous tree suitable for eroded habitats of Hawaiian Islands. In: Dagar JC (Ed) *Ravine Lands: Greening for Livelihood & Environmental Security*. Nova Publishers, New York, pp 413-431.
https://doi.org/10.1007/978-981-10-8043-2_18

Ishihara KL, Corpuz M, Morden CW, Borthakur D (2017) Evolution of *Acacia koa* on the Hawaiian Islands. In: Dagar JC and Tewari VP (eds) *Agroforestry*. Springer, Singapore. Pp: 629-643. ISBN: 978-981-10-7649-7

Ishihara K, Adamski D, Morden C, Borthakur D (2016) The Importance of *Acacia koa* in Agroforestry of Hawaii. In: Dagar JC (ed) *Agroforestry Research Development*. Nova Publishers, New York. Pp 513-521. ISBN 978-1-63485-046-9.

Jube S, and Borthakur D (2006) Recent advances in food biotechnology research. In: Hui YH, Nip W-K, Nollet LML, Paliyath G, Sahlstrøm S, and Simpson BK (eds) *Food Biochemistry and Food Processing*. pp 35-70, Blackwell Publishing, Oxford, U.K.

Borthakur D, and Soedarjo M (1999) Isolation and characterization of a DNA fragment containing genes for mimosine degradation from *Rhizobium* sp. strain TAL1145. In: Martinez, E. and Hernández, G. (eds) *Highlights of Nitrogen Fixation Research*. pp 91-96. Plenum Publishing Corp., New York.

Abaidoo R, Singleton P, Keyser H, Borthakur D, and Dashiell K (1999) Distribution and characteristics of *Bradyrhizobium* spp. nodulating African soybeans. In: Martinez, E. and Hernández, G. (eds) *Highlights of Nitrogen Fixation Research*. pp 77-84. Plenum Publishing Corp., New York.

Gubili, J. and Borthakur, D. (1998) Identification of an uptake hydrogenase gene cluster from *Anabaena* sp. strain PCC7120. In: Zaborsky, O. R. (ed) *Bio-Hydrogen*. pp 181-188. Plenum Publishing Corp., New York.

Johnston AWB, Downie JA, Rossen L, ShearmanCA, Firmin JL, Borthakur D, Wood EA, Bradley D, and Brewin NJ (1987) Molecular analysis of *Rhizobium* genes involved in the induction of nitrogen-fixing nodules on legumes. *Phil. Trans. R. Soc. Lond. B* 317:193-207.

Conference Proceedings

Borthakur D, McKinley K, and Bylina EJ (1995) Biophotoproduction: Solar energy conversion with cyanobacteria. In the Proceedings of the Department of Energy Hydrogen Program Annual Review, in Coral Gables, Florida, April 18-21, 1995, pp 141-142.

Haselkorn R, Basche M, Bohme H, Borthakur D, Borthakur PB, Buikema WJ, Mulligan ME and Norris D (1990) Nitrogen fixation in filamentous cyanobacteria. In: Gresshoff PM, Roth LE, Stacey G and Newton WE (ed) *Nitrogen Fixation: achievements and objectives*. Proceedings of 8th International Congress on Nitrogen Fixation, held at Knoxville, Tennessee, May 20-26, 1990 pp 497-504, Chapman

and Hall.

Johnston AWB, Rossen L, Shearman CA, Evans IJ, Firman JL, Downie, JA, Lamb JW and Borthakur D (1987) Studies on two sets of symbiotic genes in *Rhizobium*, one involved in early stages of infection and the other in exopolysaccharide synthesis. *In*: Atnyzen CJ and Ryan C (Ed) Molecular Strategies for Crop Production. Proceedings of Dupont-UCLA symposium held in Steamboat Springs, Colorado, March 30-April 6, 1986, pp 169-185, Alan R. Liss, Inc., New York

Leadership Roles (Committees, Boards, Advisory, etc.)

Chairman, Graduate Program in Molecular Biosciences and Bioengineering, University of Hawaii (1996 to August 2013).

Member of the Editorial Board, Applied and Environmental Microbiology (2001-2009)

Member of the Editorial Board and one of the Editors, International Journal of Microbiology (2008 - 2018)

Member of the Editorial Board and Manuscript Editor, Symbiosis (2008 to present)

Assistant Editor, World Journal of Microbiology & Biotechnology, Kluwer Academic Publishers, Dordrecht, The Netherlands (1999-2004).

Member of the Editorial Board, World Journal of Microbiology & Biotechnology, Kluwer Academic Publishers, Dordrecht, The Netherlands (1996-2005).

Member of the Organizing Committee, CTAHR Symposium from 2001 to 2013

Graduate Students

<u>Category</u>	<u>Current Number of Students</u>	<u>Number Graduated (Career)</u>
Chair of Master's Committees	1	13
Chair of PhD Committees	3	13
Member of Master's Committees	0	>20
Member of PhD Committees	6	>50

Grant Support

Title: Identification and Characterization of Genes Involved in Lignin Biosynthesis in *Acacia koa*. McIntire-Stennis; \$150,000; Date: 10/2015- 9/2020. P.I.: D. Borthakur.

Title: Producing mimosine-free *Leucaena leucocephala* through metabolic pathway engineering. National Science Foundation; \$ 272,132; Date: 10/2008 – 12/2013; P.I.: D. Borthakur.

Title: Identification of Fusarium Wilt Resistance in *Acacia Koa*. USDA-TSTAR; \$155,572; Date: 10/2009 -9/2012; P.I.: D. Borthakur.

Title: Analysis of hybrid recombinant protein to increase the specificity and coverage of in vitro diagnostic kits for *Mycobacterium tuberculosis*; Hawaii Community Foundation; \$59,630; Duration: 12/ 2005 to 6/ 2009; P.I.: D. Borthakur.

Title: Economic assessment and economic feasibility of a practical strategy for regenerating koa forests in Hawaii. USDA-TSTAR; \$157,390; Date: 10/2005 to 9/2009; P.I.: D. Borthakur.

Title: The invasiveness of the noxious weed gorse (*Ulex europaeus*) influenced by symbiosis in agricultural and natural habitats of Hawaii; USDA-TSTAR; \$233,027; Date: 10/ 2004 – 8/2009.

Title: Biochemical characterization of *Acacia koa* for commercial value and ecological attributes; McIntire-Stennis; \$60,000; Date: 10/2005 – 9/2008; P.I.: D. Borthakur.

Title: Innovation of detection mechanisms for dissolved nitrogen and bicarbonate in agriculture and the environment; USDA-TSTAR; \$239,842; Date: 10/2004-9/2007. P.I.: D.M. Jenkins; co-P.I.: D. Borthakur.

Title: The role of mimosine and mimosine-degrading bacteria in the leucaena rhizosphere; USDA-NRICGP; \$159,350. Date: 12/ 2001 -12/2006. P.I.: D. Borthakur.

Title: *Bradyrhizobium* inoculant for *Acacia koa*; USDA-TSTAR; \$ 149,005; Date: 7/2001-6/2004; P.I.: D. Borthakur.

Title: Dispersal and population genetics of invasive weeds: management implications; USDA-TSTAR; \$254,700; Date: 10/2002 - 9/2005. P.I.: A. Wiczorek; co-P.I.: D. Borthakur.

Title: Recombinant hybrid vaccines against *Mycobacterium tuberculosis*. Hawaii Community Foundation; \$ 66,602; Date: 1/2002 –12/2005. P.I. D. Borthakur.

Title: The role of mimosine in bacteria-plant interaction in the leucaena rhizosphere. USDA-NRICGP; \$130,000; Date: 11/1998 -11/2001; P.I. D. Borthakur.

Title: Improving skeletal muscle growth by immuno-modulation of myostatin bioactivity. USDA-TSTAR; \$110,868; Date: 7/1999 – 6/2002; P.I. Yong-Soo Kim; co-P.I.: D. Borthakur.

Title: Genetic improvement of the tree-legume *Leucaena* for agroforestry. USDA-CSRS; \$55,000; Date: 10/1998 -9/2001; P.I.: D. Borthakur.

Title: Genetic engineering of cabbage for sustainable pest management. USDA-TSTAR; \$184,000; Date: 7/1995-to 6/1999. P.I.: D. Borthakur.

Title: Developing a PCR method for detecting mimosine-degrading ruminal bacteria from the cattle in Hawaii. USDA-TSTAR; \$144,000; Date: 7/1995- 6/1999; P.I.: Richard Early; co-P.I.: D. Borthakur.

Title: Characterization of rhizobia of a tropical legume in sustainable agro-ecosystem in Guam. USDA-TSTAR; \$133,000; Date: 7/1995-6/1998; P.I. Mari Marutani, co-P.I.: D. Borthakur.

Title: Photobiological hydrogen production; DOE Hydrogen Program; \$50,000; Date: 10/1994-9/1995; co-P.I. D. Borthakur.

Title: Genetics of nodulation competitiveness in *Rhizobium*. USDA-NRICGP; \$120,000; Date: 9/1992-8/1996; P.I. D. Borthakur.

Presentations at Conferences

Honda MDH*, Borthakur D (2018) Mimosine facilitates metallic cation uptake by plants through formation of mimosine-cation complexes. Poster presentation by Michael Honda at the International *Leucaena* Conference 2018 held at the University of Queensland, November 1-3, 2018.

Borthakur D *(2017) Threats to and efforts to protect *Acacia koa* (koa) in Hawaii. Invited oral presentation at the National Academy of Science, Washington, D.C. on December 1, 2017. <https://vimeo.com/246478086>; <http://nas-sites.org/dels/files/2017/11/Dulal-Borthakur-Presentation.pdf>

Honda MDH*, Manami Onitsuka, Yoshimitsu Kakuta, D. Borthakur (2017) Characterization of the

Leucaena leucocephala enzyme mimosinase by site-directed substitution mutagenesis and inhibitor assays. Plant Biology 2017 held in Honolulu, HI, June 24-28, 2017.

Corpuz M*, Ishihara KL, Borthakur D (2017) Characterization of proanthocyanidins as a biomarker for wood quality in *Acacia koa*. Poster presentation by Maia Corpuz at the at Plant Biology 2017 held in Honolulu, HI, June 24-28 2017.

Ching M*, Honda M, Ishihara KL, Borthakur D (2017) Mimosine-Fe(III) peptide trasporters In *Leucaena leucocephala*. Poster presented by Mc Millan Ching at the American Association for the Advancement of Science (AAAS) Annual Meeting held in Boston from February 16-20, 2017

Ishihara K*, Lee EKW, Borthakur D (2016) Mechanical stress induces disease resistance against *Fusarium oxysporum* in *Acacia koa*. Poster presentation at the Missouri Natural Resources Conference, held at Osage Beach, Missouri on February 3-5, 2016.

Ishihara K*, Lee EW, Borthakur D (2015) Mechanical stimuli induce expression of genes involved in disease resistance in *Acacia koa*. Poster presentation made by Kazue Ishihara at the 42nd Annual Conference of the Plant Growth Regulation Society of America (PGRSA) held at the Sheraton Kona Resort, Hawaii on July 19-23, 2015.