Mallikarjuna Rao Kovi

PhD · Plant genetics and breeding

Research Scientist and SustainPlant Group Leader, Norwegian University of Life Sciences (NMBU), Ås, Norway. R&D Scientist (20%), Graminor AS, Hamar.

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Research profile

Kovi studies how outcrossing forage crops respond to selection, seed multiplication, winter stress and nitrogen supply. He combines population genetics, genomic prediction, root transcriptomics and field phenotyping to guide Nordic forage breeding. In TWIN-NUE, he studies nitrogen use efficiency in perennial ryegrass and oat. He is now extending this research to barley. In GE-Sustain, he leads the work package on genes affecting potato disease resistance and processing quality.

Appointments

Since Mar 2024 — **R&D Scientist, Graminor AS (20%)**
Genomic prediction, pre-breeding and crop modelling in forage and cereal breeding programmes.

Since Feb 2015 — **Research Scientist, Department of Plant Sciences, NMBU**
Founded the SustainPlant Group in 2023. Leads research projects with breeders, industry and farmers.

Jan 2011 – Jan 2015 — **Postdoctoral Researcher, Department of Plant Sciences, NMBU**
Studied adaptation of perennial forage crops in the VARCLIM trials at five Norwegian locations, from Ås to Alta.

Education

2006–2011 — **PhD in Molecular Biology and Biochemistry**
Huazhong Agricultural University, Wuhan, China. Quantitative trait locus mapping and fine mapping of rice yield components.

2003–2005 — **MSc in Biotechnology**
Bangalore University, India.

2000–2003 — **BSc in Microbiology, Biochemistry and Chemistry**
Sri Venkateswara University, Tirupati, India.

Recognition

EUCARPIA Beat Boller Award, 2025. Awarded by the Fodder Crops and Amenity Grasses Section for achievements in forage and turf breeding. China Scholarship Council award for doctoral studies, 2006–2010.

Research leadership

Kovi leads projects and work packages in a portfolio of approximately NOK 45 million. Figures below distinguish project budgets from his own work-package allocations.

Project leadership and doctoral funding

Soil2Milk **17.3 MNOK**

2026–2030. Links grass and clover mixtures, forage nitrogen use and dairy sustainability. Consortium budget includes NOK 16 million from the Research Council of Norway and NOK 1.3 million from industry.

DLT-Farming **12.0 MNOK**

Combines drones, a field robot, sensors and genomics to evaluate 40 perennial ryegrass cultivars under three nitrogen treatments at Ås and Hamar. Field trials began in 2024.

TWIN-NUE **5.5 MNOK**

2026–2029. PheNo and NMBU support 3D phenotyping and digital twins to study nitrogen response in oat and perennial ryegrass.

Doctoral project in perennial ryegrass **5.0 MNOK**

2026–2029. Project lead for an NMBU-funded PhD on gene editing for nitrogen use efficiency.

ProteinSense **0.75 MNOK**

2026–2028. Forage protein and harvest timing, with TINE, Yara and Graminor.

N-Vakt **0.75 MNOK**

Funded in October 2026. Satellite mapping of nitrogen surplus and leaching risk in grassland, in collaboration with Agdir Drift AS.

NitroGenEdit **0.75 MNOK**

2024–2026. Hydroponic screening and gene editing to study nitrogen use in perennial ryegrass.

Work-package leadership

GE-Sustain. Leads gene discovery for disease resistance and industrial quality in potato. The work package has a NOK 3 million allocation within a NOK 16 million consortium project.

Climate-Proof Barley and NitroPotet. Work-package leadership on combined drought and heat stress in barley and on nitrogen-use screening in potato. Each project has a NOK 0.75 million total budget.

Earlier research projects

Led work packages on genomic selection in timothy (GenSelTim) and cultivar adaptation and seed multiplication (NexTim). Led an NMBU-funded doctoral project on timothy population genetics and machine learning (2021–2024). Contributed to the Nordic forage pre-breeding partnership and EditGrass4Food.

Teaching and supervision

Teaching at NMBU

Since autumn 2026

PJH212 · Forage and Seed Crop Production

Course coordinator and lecturer. Organises field teaching, excursions and group work, and designs and grades assessments.

2024–2025

BIO321 / BIO421 · Population Genetics

Co-taught the MSc and PhD course. Covered genetic drift, selection and effective population size using examples from plant breeding.

Since 2015

BIN300 · Statistical Genomics

Leads the sequencing module. Students analyse RNA-seq and variant data, interpret their results and discuss biological and technical limitations.

2021–2026

Guest teaching and doctoral training

Guest lectures in applied plant biotechnology, gene function and high-throughput plant phenotyping. Taught transcriptome analysis to doctoral candidates at TalTech and LAMMC during EditGrass4Food (2021–2024).

Research supervision

Stage	Completed	Ongoing in November 2026
PhD	6 (2 as main supervisor)	4 (1 as main supervisor)
MSc	11 (5 as main supervisor)	6 (all as main supervisor)
Postdoctoral	Not reported	1 researcher

Main supervisor for Crystal Turnbull and Akhil Reddy Pashapu, both of whom defended their doctoral theses at NMBU in February 2025. MSc projects use shared field and laboratory trials with industry partners.

Pedagogical development

Completed **Master and PhD Supervision** at NMBU in 2023 (5 ECTS). Enrolled in **Teaching and Learning in Higher Education** at Østfold University College, 2026–2027 (10 ECTS). External examiner for master's theses at Inland Norway University of Applied Sciences in 2023 and 2025.

Academic and professional service

Deputy member of the Faculty Board (2025–2029) and Faculty Research Committee (since 2025), NMBU Faculty of Biosciences. Editorial Board member of *Forage* and Review Editor for the Plant Breeding section of *Frontiers in Plant Science*. Proposal evaluator for Canada's New Frontiers in Research Fund (2026).

Peer-reviewed publications

Papers 1–9 of 28. Select a title to open the paper. Google Scholar recorded 929 citations and an h-index of 14 in November 2026.

1 **Kovi MR**, Pashapu AR, Amdahl H, Gylstrøm K, Windju S, Marum P, Alsheikh M, Rognli OA (2026)
Genomic selection in timothy (Phleum pratense L.): a comprehensive evaluation of prediction models, multi-trait strategies, and forward validation across Norwegian environments. Theoretical and Applied Genetics 139: 262.

2 Pashapu AR, Dalmannsdottir S, Jørgensen M, **Kovi MR**, Rognli OA (2026)
Allele frequency and gene expression differences under key winter stresses in temporal populations of two timothy cultivars. Theoretical and Applied Genetics 139: 161.

3 Aamlid TS, Dalmannsdottir S, Hellton KH, Jørgensen M, Sturite I, Fossdal CG, Pashapu AR, **Kovi MR**, Amdahl H, Rognli OA (2026)
Freezing and ice encasement tolerance of Arctic timothy varieties after seed multiplication for one, two or three generations at lower latitudes. Grass and Forage Science 81(3): e70076.

4 Pashapu AR, Dalmannsdottir S, Jørgensen M, Rognli OA, **Kovi MR** (2026)
Surviving under ice: gene expression changes during ice encasement in timothy (Phleum pratense L.) overlap with freezing and hypoxia stress responses. Plant Stress 21: 101372.

5 Sustek-Sánchez F, Pashapu AR, Kemešytė V, **Kovi MR**, Rognli OA, Sarmiento C, Rostoks N, Jaškūnė K (2026)
Growth under mild drought: transcriptomics comparison of perennial ryegrass genotypes with differential tolerance to water deficit. Journal of Plant Interactions 21(1): 2741937.

6 Ergon Å, **Kovi MR**, Goecke F, Pashapu AR, Haughom SOA, Aldridge D, Forbord S (2026)
Responses of sugar kelp to higher light intensity: growth, gene expression and content of iodine, bromine and vanadium. Algal Research 99: 104985.

7 Ferreira da Costa I, **Kovi MR**, Candea Leite A (2025)
Development of an IoT sensor-based system for soil monitoring: conceptual design and experiments. IFAC-PapersOnLine 59(23): 291-296.

8 Pashapu AR, Dalmannsdottir S, Jørgensen M, Schubert M, Rognli OA, **Kovi MR** (2024)
Frost survival and gene expression in timothy (Phleum pratense L.) cultivars as affected by age and selection in diverse field environments. Physiologia Plantarum 176(1): e14217.

9 Pashapu AR, Statkevičiūtė G, Sustek-Sánchez F, **Kovi MR**, Rognli OA, Sarmiento C, Rostoks N, Jaškūnė K (2024)
Transcriptome profiling reveals insight into the cold response of perennial ryegrass genotypes with contrasting freezing tolerance. Plant Stress 14: 100598.

Peer-reviewed publications

Papers 10–18 of 28. Select a title to open the paper.

10 Haile AT, **Kovi MR**, Johnsen SS, Hvoslef-Eide T, Tesfaye B, Rognli OA (2024)
Limited genetic diversity found among genotypes of the Entada landrace (Ensete ventricosum (Welw.) Cheesman) from Ethiopia. Frontiers in Plant Science 15: 1336461.

11 Haile AT, **Kovi MR**, Johnsen SS, Tesfaye B, Hvoslef-Eide T, Rognli OA (2023)
Genetic diversity, population structure and selection signatures in enset (Ensete ventricosum (Welw.) Cheesman), an underutilized and key food security crop in Ethiopia. Genetic Resources and Crop Evolution 71: 1159-1176 (online July 2023, issue dated 2024).

12 Wendmu TA, Gebrelibanos TS, **Kovi MR**, Ring KH, de Boer HJ, Abera FA, Westengen OT (2023)
"People gathered by sorghum": cultural practices and sorghum diversity in northern Ethiopia. Human Ecology 51: 923-935.

13 Sustek-Sánchez F, Rognli OA, Rostoks N, Sõmera M, Jaškūnė K, **Kovi MR**, Statkevičiūtė G, Sarmiento C (2023)
Improving abiotic stress tolerance of forage grasses: prospects of using genome editing. Frontiers in Plant Science 14: 1127532.

14 Rognli OA, Pecetti L, **Kovi MR**, Annicchiarico P (2021)
Grass and legume breeding matching the future needs of European grassland farming. Grass and Forage Science 76(2): 175-185.

15 Samy JKA, Rognli OA, **Kovi MR** (2020)
ForageGrassBase: molecular resource for the forage grass meadow fescue (Festuca pratensis Huds.). Database 2020: baaa046.

16 Reveco-Urzua FE, Hofossæter M, **Kovi MR**, Mydland LT, Ånestad R, Sørby R, Press CM, Lagos L, Øverland M (2019)
Candida utilis yeast as a functional protein source for Atlantic salmon (Salmo salar L.): local intestinal tissue and plasma proteome responses. PLoS ONE 14(12): e0218360.

17 **Kovi MR**, Amdahl H, Alsheikh M, Rognli OA (2017)
De novo and reference transcriptome assembly of transcripts expressed during flowering provide insight into seed setting in tetraploid red clover. Scientific Reports 7: 44383.

18 **Kovi MR**, Ergon Å, Rognli OA (2016)
Freezing tolerance revisited: effects of variable temperatures on gene regulation in temperate grasses and legumes. Current Opinion in Plant Biology 33: 140-146.

Peer-reviewed publications

Papers 19–28 of 28. Select a title to open the paper.

19 **Kovi MR**, Abdelhalim M, Kunapareddy A, Ergon Å, Tronsmo AM, Brurberg MB, Hofgaard IS, Asp T, Rognli OA (2016)
Global transcriptome changes in perennial ryegrass during early infection by pink snow mould. Scientific Reports 6: 28702.

20 Amdahl H, Aamlid TS, Ergon Å, **Kovi MR**, Marum P, Alsheikh M, Rognli OA (2016)
Seed yield of Norwegian and Swedish tetraploid red clover (Trifolium pratense L.) populations. Crop Science 56(2): 603-612.

21 **Kovi MR**, Fjellheim S, Sandve SR, Larsen A, Rudi H, Asp T, Kent MP, Rognli OA (2015)
Population structure, genetic variation, and linkage disequilibrium in perennial ryegrass populations divergently selected for freezing tolerance. Frontiers in Plant Science 6: 929.

22 **Kovi MR**, Hu Y, Bai X, Xing Y (2015)
QTL mapping for thermo-sensitive heading date in rice. Euphytica 205: 51- 62.

23 **Kovi MR**, Sablok G, Bai X, Wendell M, Rognli OA, Yu H, Xing Y (2013)
Expression patterns of photoperiod and temperature regulated heading date genes in Oryza sativa. Computational Biology and Chemistry 45: 36-41.

24 **Kovi MR**, Zhang Y, Yu S, Yang G, Yan W, Xing Y (2011)
Candidacy of a chitin-inducible gibberellin-responsive gene for a major locus affecting plant height in rice that is closely linked to Green Revolution gene sd1. Theoretical and Applied Genetics 123: 705-714.

25 **Kovi MR**, Bai X, Mao D, Xing Y (2011)
Impact of seasonal changes on spikelets per panicle, panicle length and plant height in rice (Oryza sativa L.). Euphytica 179: 319-331.

26 Bai XF, Luo LJ, Yan WH, **Kovi MR**, Xing YZ (2011)
Quantitative trait loci for rice yield-related traits using recombinant inbred lines derived from two diverse cultivars. Journal of Genetics 90: 209-215.

27 Liu T, Shao D, **Kovi MR**, Xing Y (2010)
Mapping and validation of quantitative trait loci for spikelets per panicle and 1,000-grain weight in rice (Oryza sativa L.). Theoretical and Applied Genetics 120: 933-942 (online December 2009).

28 Bai X, Luo L, Yan W, **Kovi MR**, Zhan W, Xing Y (2010)
Genetic dissection of rice grain shape using a recombinant inbred line population derived from two contrasting parents and fine mapping a pleiotropic quantitative trait locus qGL7. BMC Genetics 11: 16.

Other scholarly work

Book chapters and conference proceedings

B1 Theodorou I, **Kovi MR**, Liang Z, Opsahl-Sorteberg HG (2022)
Genetic and genomic approaches for improved and sustainable brown algal cultivation. In: Ranga Rao A, Ravishankar GA (eds) Sustainable Global Resources of Seaweeds, Volume 2. Springer, Cham, pp 615-633.

B2 Rognli OA, Aavola R, Aleliūnas A, Asp T, Brazauskas G, Gylstrøm KH, Helgadottir A, Isolahti M, **Kovi MR**, Kristjánsdóttir TA, Larsen AS, Marum P, Paina C, Persson C, Rancāne S (2018)
Utilization of genebank accessions to improve northern adaptation of perennial ryegrass (Lolium perenne L.). In: Brazauskas G, Statkevičiūtė G, Jonavičienė K (eds) Breeding Grasses and Protein Crops in the Era of Genomics. Springer, Cham, pp 3-8.

B3 **Kovi MR** et al. (2016)
Genome-wide allelic shifts in forage crops when grown at five diverse locations across Norway. In: The multiple roles of grassland in the European bioeconomy. Proceedings of the 26th General Meeting of the European Grassland Federation, Trondheim, Norway, 4-8 September 2016. Grassland Science in Europe 21.

B4 **Kovi MR**, Rognli OA (2013)
Meadow fescue (Festuca pratensis Huds.). In: Cai H, Yamada T, Kole C (eds) Genetics, Genomics and Breeding of Forage Crops. CRC Press, Boca Raton, chapter 5.

Selected public preprints

A constitutively active cortical nitrate-uptake cell state underlies nitrogen-use efficiency in perennial ryegrass. Kovi MR et al., bioRxiv (2026).

Precipitation dominates timothy yield variation in Norwegian breeding trials: interpretable ensemble machine learning identifies climate-adaptive parental combinations. Kovi MR et al., SSRN (2026).

PhytoScan3D: an open-source Python pipeline for batch extraction of phenotypic traits from 3D point cloud files generated by multispectral plant phenotyping sensors. Kovi MR, Candea Leite A, Lillemo M, bioRxiv (2026).

Open resources

Perennial ryegrass root atlas for single-nucleus expression data. ForageGrassBase for meadow fescue genomics. Comparative genome browser for the International Lolium-Festuca Pangenome Consortium. PhytoScan3D for phenotypic trait extraction from 3D point clouds.

Open expression datasets in ArrayExpress: E-MTAB-4459, E-MTAB-5117, E-MTAB-13531.

Selected presentations

Invited lecture on nitrogen use efficiency in ryegrass, **Seeds of Resilience**, Malmö (2026). Oral presentation, **International Forage and Turf Breeding Conference**, Qingdao (2026). Presentations on ryegrass nitrogen efficiency and timothy yield modelling, **EUCARPIA Fodder Crops and Amenity Grasses Section**, Aberystwyth (2025).