

# READ FREE ABIOTIC STRESS TOLERANCE IN CROP PLANTS BREEDING AND BIOTECHNOLOGY (READ ONLY)

CROP PLANTS COMBAT DROUGHT THROUGH ACCLIMATIZATION AND SPECIFIC TOLERANCE MECHANISMS TO ADAPT TO ADVERSE CONDITIONS SCIENTISTS CAN USE THESE EVOLUTIONARY MECHANISMS TO COMBAT YIELD LOSS AND MEET THE GROWING FOOD DEMANDS OF A GROWING POPULATION THIS REVIEW DISCUSSES CROP TRAITS THAT CAN CONFER DROUGHT TOLERANCE THE ROLE OF THE ENVIRONMENT AND MANAGEMENT AND HOW CROP MODELS PREDICT THEIR POTENTIAL IMPACT ON YIELD MODIFICATION OF TRAITS RELATED TO ABIOTIC AND BIOTIC STRESS TOLERANCE PLANT WATER STRESS TOLERANCE IS A COMPLEX TRAIT THAT PRODUCES PROFOUND MODIFICATIONS OF THE PLANTS MORPHOLOGICAL PHYSIOLOGICAL AND METABOLIC CHARACTERISTICS DROUGHT TOLERANCE INVOLVES MECHANISMS OPERATING AT DIFFERENT SPATIAL AND TEMPORAL SCALES FROM RAPID STOMATAL CLOSURE TO MAINTENANCE OF CROP YIELD WE REVIEW HOW SHORT TERM MECHANISMS ARE CONTROLLED FOR STABILIZING SHOOT WATER POTENTIAL AND HOW LONG TERM PROCESSES HAVE BEEN CONSTRAINED BY EVOLUTION KNOWN POSITIVE AND NEGATIVE REGULATORS OF DROUGHT BLUE BOX AND SALINITY YELLOW BOX STRESS TOLERANCE ARE IDEAL TARGETS FOR CROP IMPROVEMENT DESCRIPTIONS OF DIFFERENT ASPECTS DEPICTED HERE ARE PROVIDED IN THE MAIN TEXT THREE COLD ACCLIMATION RESPONSE PATHWAYS CA 2 MEDIATED ICE 1 CBF DREB 1 HORMONAL AND REACTIVE OXYGEN SPECIES ROS ARE ELUCIDATED ALSO THIS REPORT SUMMARIZES THE LATEST RESEARCH WORK ON GENETICS AND GENOMICS OF FORAGE SPECIES FROM THE PERSPECTIVES OF COLD TOLERANCE IMPROVEMENT THE MAIN GOAL OF STUDYING PLANT STRESS RESPONSES IS TO DEVELOP CROPS WITH IMPROVED TOLERANCE TO ABIOTIC STRESSES THE KNOWLEDGE OF ABA BEING A KEY REGULATOR OF ABIOTIC STRESS RESPONSES HAS BEEN UTILIZED FOR DEVELOPING CROPS WITH ENHANCED TOLERANCE UNDER STRESS CONDITIONS IN RESPONSE TO HIGH TEMPERATURES CROP PLANTS RESPOND WITH A TOLERANCE MECHANISM COMPOSED OF VARIOUS BIOCHEMICAL FACTORS WHICH INCLUDE HEAT SHOCK PROTEINS OSMOPROTECTANTS ION TRANSPORTERS AND PRODUCTION OF ANTIOXIDANTS NANOBIO TECHNOLOGY APPROACHES TO ENGINEERING CROPS WITH ENHANCED STRESS TOLERANCE MAY BE A SAFE AND SUSTAINABLE STRATEGY TO INCREASE CROP YIELD ABSTRACT PLANTS TAKE UP SILICON SI FROM THE SOIL WHICH IMPACTS THEIR GROWTH AND NUTRIENT ACCUMULATION IT INCREASES PLANT RESISTANCE TO ABIOTIC AND BIOTIC STRESSES SUCH AS DROUGHT SALINITY AND HEAVY METAL DISEASES AND PEST INFESTATION THE FINDINGS SUMMARIZED IN THIS REVIEW HAVE SHOWN POTENTIAL PRACTICAL APPLICATIONS FOR BREEDING COLD TOLERANCE IN CROP AND HORTICULTURAL PLANTS SUITABLE TO TEMPERATE GEOGRAPHICAL LOCATIONS IN THIS CHAPTER WE DISCUSS RECENT ADVANCES IN ENGINEERING DROUGHT AND SALINITY TOLERANCE IN CROP PLANTS WITH EMPHASIS ON YIELD AND THE NEEDS TO CLOSE THE GAPS BETWEEN THE LABORATORY AND THE FIELD CONDITIONS GENOMIC ROADMAPS FOR AUGMENTING SALINITY STRESS TOLERANCE IN CROP PLANTS AT THE PRESENT TIME NO EFFECTIVE BROADLY DEPLOYED TOLERANCE IS AVAILABLE FOR MAJORITY OF THE CROPS DEVELOPMENT OF EFFECTIVE APPLICABLE GENE BASED STRATEGIES FOR DROUGHT TOLERANCE WILL HELP TO MITIGATE THIS ADVERSE ABIOTIC STRESS THE EFFECT OF THIS STRESS ON CROP PRODUCTIVITY DEPENDS ON THE STAGE OF DEVELOPMENT AND DURATION OF DROUGHT IN OUR STUDY APPROACHES OF MORPHOLOGICAL PHYSIOLOGICAL BIOCHEMICAL AND MOLECULAR LEVELS CAN BE SHOWN TO IMPROVE DROUGHT TOLERANCE FOR ALMOND THESE STRATEGIES WILL BE NECESSARY FOR CROP THIS REVIEW CONSIDERS THE ENERGETIC COSTS OF SALINITY TOLERANCE IN CROP PLANTS AND PROVIDES A FRAMEWORK FOR A QUANTITATIVE ASSESSMENT OF COSTS DIFFERENT SOURCES OF ENERGY AND MODIFICATIONS OF ROOT SYSTEM ARCHITECTURE THAT WOULD MAXIMIZE WATER VS ION UPTAKE ARE ADDRESSED THUS WE CONCLUDED THAT SHORT TERM SOIL WATERLOGGING IMPROVED COTTON CROSS TOLERANCE TO THE CONTINUED HIGH HT STRESS BY ENHANCED SOD CAT POD AND DHAR ACTIVITIES INCREASED ASA CONTENT IN COTTON SEEDLINGS THESE RESULTS WERE EXPECTED TO PROVIDE A THEORETICAL BASIS FOR UNDERSTANDING COTTON S CROSS TOLERANCE TO ABIOTIC STRESS THE FINDINGS SUMMARIZED IN THIS REVIEW HAVE SHOWN POTENTIAL PRACTICAL APPLICATIONS FOR BREEDING COLD TOLERANCE IN CROP AND HORTICULTURAL PLANTS SUITABLE TO TEMPERATE GEOGRAPHICAL LOCATIONS KEYWORDS COLD STRESS CROP PLANTS GENETIC ENGINEERING TRANSCRIPTION FACTORS STRESS RELATED GENES ARE INDUCED PRIMARILY AT THE LEVEL OF TRANSCRIPTION AND REGULATING THE TEMPORAL AND SPATIAL EXPRESSION PATTERNS OF SPECIFIC STRESS GENES IS AN IMPORTANT PART OF THE PLANT STRESS RESPONSE CDNA MICROARRAYS AND GENOMICS

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APPROACHES REVEAL A CLEAR OVERLAP IN THE GENES EXPRESSED IN RESPONSE TO DIFFERENT STRESSES THE FINDINGS SUMMARIZED IN THIS REVIEW HAVE SHOWN  
POTENTIAL PRACTICAL APPLICATIONS FOR BREEDING COLD TOLERANCE IN CROP AND HORTICULTURAL PLANTS SUITABLE TO TEMPERATE GEOGRAPHICAL LOCATIONS

**FULL ARTICLE PLANT DROUGHT STRESS TOLERANCE UNDERSTANDING** MAY 24 2024 CROP PLANTS COMBAT DROUGHT THROUGH ACCLIMATIZATION AND SPECIFIC TOLERANCE MECHANISMS TO ADAPT TO ADVERSE CONDITIONS SCIENTISTS CAN USE THESE EVOLUTIONARY MECHANISMS TO COMBAT YIELD LOSS AND MEET THE GROWING FOOD DEMANDS OF A GROWING POPULATION

**CROP TRAITS AND PRODUCTION UNDER DROUGHT NATURE REVIEWS** APR 23 2024 THIS REVIEW DISCUSSES CROP TRAITS THAT CAN CONFER DROUGHT TOLERANCE THE ROLE OF THE ENVIRONMENT AND MANAGEMENT AND HOW CROP MODELS PREDICT THEIR POTENTIAL IMPACT ON YIELD

**NEW APPROACHES TO IMPROVE CROP TOLERANCE TO BIOTIC AND** MAR 22 2024 MODIFICATION OF TRAITS RELATED TO ABIOTIC AND BIOTIC STRESS TOLERANCE PLANT WATER STRESS TOLERANCE IS A COMPLEX TRAIT THAT PRODUCES PROFOUND MODIFICATIONS OF THE PLANTS MORPHOLOGICAL PHYSIOLOGICAL AND METABOLIC CHARACTERISTICS

**THE PHYSIOLOGICAL BASIS OF DROUGHT TOLERANCE IN CROP PLANTS** FEB 21 2024 DROUGHT TOLERANCE INVOLVES MECHANISMS OPERATING AT DIFFERENT SPATIAL AND TEMPORAL SCALES FROM RAPID STOMATAL CLOSURE TO MAINTENANCE OF CROP YIELD WE REVIEW HOW SHORT TERM MECHANISMS ARE CONTROLLED FOR STABILIZING SHOOT WATER POTENTIAL AND HOW LONG TERM PROCESSES HAVE BEEN CONSTRAINED BY EVOLUTION

**ENGINEERING DROUGHT AND SALINITY TOLERANCE TRAITS IN CROPS** JAN 20 2024 KNOWN POSITIVE AND NEGATIVE REGULATORS OF DROUGHT BLUE BOX AND SALINITY YELLOW BOX STRESS TOLERANCE ARE IDEAL TARGETS FOR CROP IMPROVEMENT DESCRIPTIONS OF DIFFERENT ASPECTS DEPICTED HERE ARE PROVIDED IN THE MAIN TEXT

**COLD STRESS IN PLANTS STRATEGIES TO IMPROVE COLD TOLERANCE** DEC 19 2023 THREE COLD ACCLIMATION RESPONSE PATHWAYS CA 2 MEDIATED ICE 1 CBF DREB 1 HORMONAL AND REACTIVE OXYGEN SPECIES ROS ARE ELUCIDATED ALSO THIS REPORT SUMMARIZES THE LATEST RESEARCH WORK ON GENETICS AND GENOMICS OF FORAGE SPECIES FROM THE PERSPECTIVES OF COLD TOLERANCE IMPROVEMENT

**ABSCISIC ACID AND ABIOTIC STRESS TOLERANCE IN CROP PLANTS** NOV 18 2023 THE MAIN GOAL OF STUDYING PLANT STRESS RESPONSES IS TO DEVELOP CROPS WITH IMPROVED TOLERANCE TO ABIOTIC STRESSES THE KNOWLEDGE OF ABA BEING A KEY REGULATOR OF ABIOTIC STRESS RESPONSES HAS BEEN UTILIZED FOR DEVELOPING CROPS WITH ENHANCED TOLERANCE UNDER STRESS CONDITIONS

**HEAT STRESS TOLERANCE IN CROP PLANTS PHYSIOLOGICAL AND** OCT 17 2023 IN RESPONSE TO HIGH TEMPERATURES CROP PLANTS RESPOND WITH A TOLERANCE MECHANISM COMPOSED OF VARIOUS BIOCHEMICAL FACTORS WHICH INCLUDE HEAT SHOCK PROTEINS OSMOPROTECTANTS ION TRANSPORTERS AND PRODUCTION OF ANTIOXIDANTS

**NANOBIOTECHNOLOGY BASED STRATEGIES FOR ENHANCED CROP STRESS** SEP 16 2023 NANOBIOTECHNOLOGY APPROACHES TO ENGINEERING CROPS WITH ENHANCED STRESS TOLERANCE MAY BE A SAFE AND SUSTAINABLE STRATEGY TO INCREASE CROP YIELD

**GROWTH NUTRIENT ACCUMULATION AND DROUGHT TOLERANCE IN CROP** AUG 15 2023 ABSTRACT PLANTS TAKE UP SILICON SI FROM THE SOIL WHICH IMPACTS THEIR GROWTH AND NUTRIENT ACCUMULATION IT INCREASES PLANT RESISTANCE TO ABIOTIC AND BIOTIC STRESSES SUCH AS DROUGHT SALINITY AND HEAVY METAL DISEASES AND PEST INFESTATION

**ENGINEERING COLD STRESS TOLERANCE IN CROP PLANTS PMC** JUL 14 2023 THE FINDINGS SUMMARIZED IN THIS REVIEW HAVE SHOWN POTENTIAL PRACTICAL APPLICATIONS FOR BREEDING COLD TOLERANCE IN CROP AND HORTICULTURAL PLANTS SUITABLE TO TEMPERATE GEOGRAPHICAL LOCATIONS

**ENGINEERING SALINITY AND WATER STRESS TOLERANCE IN CROP** JUN 13 2023 IN THIS CHAPTER WE DISCUSS RECENT ADVANCES IN ENGINEERING DROUGHT AND SALINITY TOLERANCE IN CROP PLANTS WITH EMPHASIS ON YIELD AND THE NEEDS TO CLOSE THE GAPS BETWEEN THE LABORATORY AND THE FIELD CONDITIONS

**POTENTIAL BREEDING STRATEGIES FOR IMPROVING SALT TOLERANCE IN** MAY 12 2023 GENOMIC ROADMAPS FOR AUGMENTING SALINITY STRESS TOLERANCE IN CROP PLANTS

**DROUGHT TOLERANCE IN CROP PLANTS FRONTIERS RESEARCH TOPIC** APR 11 2023 AT THE PRESENT TIME NO EFFECTIVE BROADLY DEPLOYED TOLERANCE IS AVAILABLE FOR MAJORITY OF THE CROPS DEVELOPMENT OF EFFECTIVE APPLICABLE GENE BASED STRATEGIES FOR DROUGHT TOLERANCE WILL HELP TO MITIGATE THIS ADVERSE ABIOTIC STRESS THE EFFECT OF THIS STRESS ON CROP PRODUCTIVITY DEPENDS ON THE STAGE OF DEVELOPMENT AND DURATION OF DROUGHT

**PDF DROUGHT TOLERANCE IN CROP PLANTS RESEARCHGATE** MAR 10 2023 IN OUR STUDY APPROACHES OF MORPHOLOGICAL PHYSIOLOGICAL BIOCHEMICAL AND

MOLECULAR LEVELS CAN BE SHOWN TO IMPROVE DROUGHT TOLERANCE FOR ALMOND THESE STRATEGIES WILL BE NECESSARY FOR CROP

**ENERGY COSTS OF SALT TOLERANCE IN CROP PLANTS MUNNS 2020** FEB 09 2023 THIS REVIEW CONSIDERS THE ENERGETIC COSTS OF SALINITY TOLERANCE IN CROP PLANTS AND PROVIDES A FRAMEWORK FOR A QUANTITATIVE ASSESSMENT OF COSTS DIFFERENT SOURCES OF ENERGY AND MODIFICATIONS OF ROOT SYSTEM ARCHITECTURE THAT WOULD MAXIMIZE WATER VS ION UPTAKE ARE ADDRESSED

SHORT TERM SOIL WATERLOGGING IMPROVES COTTON TOLERANCE TO JAN 08 2023 THUS WE CONCLUDED THAT SHORT TERM SOIL WATERLOGGING IMPROVED COTTON CROSS TOLERANCE TO THE CONTINUED HIGH HT STRESS BY ENHANCED SOD CAT POD AND DHAR ACTIVITIES INCREASED ASA CONTENT IN COTTON SEEDLINGS THESE RESULTS WERE EXPECTED TO PROVIDE A THEORETICAL BASIS FOR UNDERSTANDING COTTON S CROSS TOLERANCE TO ABIOTIC STRESS

**ENGINEERING COLD STRESS TOLERANCE IN CROP PLANTS PUBMED** DEC 07 2022 THE FINDINGS SUMMARIZED IN THIS REVIEW HAVE SHOWN POTENTIAL PRACTICAL APPLICATIONS FOR BREEDING COLD TOLERANCE IN CROP AND HORTICULTURAL PLANTS SUITABLE TO TEMPERATE GEOGRAPHICAL LOCATIONS KEYWORDS COLD STRESS CROP PLANTS GENETIC ENGINEERING TRANSCRIPTION FACTORS

ROLE OF TRANSCRIPTION FACTORS IN ABIOTIC STRESS TOLERANCE IN NOV 06 2022 STRESS RELATED GENES ARE INDUCED PRIMARILY AT THE LEVEL OF TRANSCRIPTION AND REGULATING THE TEMPORAL AND SPATIAL EXPRESSION PATTERNS OF SPECIFIC STRESS GENES IS AN IMPORTANT PART OF THE PLANT STRESS RESPONSE CDNA MICROARRAYS AND GENOMICS APPROACHES REVEAL A CLEAR OVERLAP IN THE GENES EXPRESSED IN RESPONSE TO DIFFERENT STRESSES

GENETIC ENGINEERING FOR COLD STRESS TOLERANCE IN CROP PLANTS OCT 05 2022 THE FINDINGS SUMMARIZED IN THIS REVIEW HAVE SHOWN POTENTIAL PRACTICAL APPLICATIONS FOR BREEDING COLD TOLERANCE IN CROP AND HORTICULTURAL PLANTS SUITABLE TO TEMPERATE GEOGRAPHICAL LOCATIONS

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