Main energy storage substances in rice seeds

What regulates rice seed storability?

This article reviews the main regulatory mechanisms of rice seed storability,including the accumulation of seed storage proteins,late embryogenesis abundant (LEA) proteins,heat shock proteins,sugar signaling,hormonal regulation by gibberellins and abscisic acid,and the role of the ubiquitination pathway.

Are rice seeds a storage protein?

The vast majority of proteins in rice seeds are storage proteins,and the content and composition of rice storage proteins (RSPs) have important impacts on the cooking and eating quality,nutritional value,and processing and appearance quality (Lang et al,2013).

What factors affect rice seed storability?

Rice seed storability is influenced by both genetic and environmental factors. Key proteins like LEA,heat shock,and storage proteins regulate storability. Sugar signaling and hormone regulation are vital for seed storability. Advances include using wild rice genes,marker-assisted selection,and CRISPR/Cas9.

Why is rice seed storability important?

Sugar signaling and hormone regulation are vital for seed storability. Advances include using wild rice genes,marker-assisted selection,and CRISPR/Cas9. The storability of rice seeds is crucial for ensuring flexible planting options,agricultural seed security,and global food safety.

What nutrient is found in rice seeds?

Among these primary nutrient components,starchand storage proteins account for ~90% and 5-8% of the dry weight of rice seeds,respectively,and 60-80% and 20-30% of the proteins belong to the glutelins and prolamins,respectively (Zhou et al.,2013).

Where are the nutrients stored in a rice seed?

Most nutrients of the seeds are stored in the endosperm. The triploid endosperm of rice develops from the fertilized polar nucleus. The endosperm at the filling stage consists of the aleurone layer,subaleurone layer,and starch endosperm,from outside to inside,respectively (Wu et al. 2016a).

We speculated that energy conversion from carbohydrates and/or fatty acids to amino acids was increased. Analysis of basic metabolism networks allowed us to understand how rice plants ...

Seeds are one of the most important food sources, providing humans and animals with essential nutrients. These nutrients include carbohydrates, lipids, proteins, vitamins and minerals.

Endosperm development is a complex process, involving a series of processes such as cell division and

differentiation, transport and accumulation of photosynthetic products, and enrichment of stored substances. Among the storage products in the rice endosperm, starch and seed storage proteins (SSPs) are the major nutritional components, both of ...

This article reviews the main regulatory mechanisms of rice seed storability, including the accumulation of seed storage proteins, late embryogenesis abundant (LEA) ...

DOI: 10.1016/j.plantsci.2016.05.010 Corpus ID: 207389743; ADP-glucose pyrophosphorylase large subunit 2 is essential for storage substance accumulation and subunit interactions in rice endosperm.

Grain and legume seeds cannot obtain energy from the outside world during germination, so they must degrade their own storage substances to provide energy for growth. There are a large number of bound enzymes stored in quiescent dry seeds, and these dormant enzymes could be activated under suitable conditions, resulting in enzymatic hydrolysis.

In general, the main components of rice grain quality are milling quality (MQ), appearance quality (AQ), eating and cooking quality (ECQ), and nutritional quality (NQ). ... coordinates various pathways to regulate endosperm development and the accumulation of seed storage substances in rice. The phenotype of the osnf-yb12 mutant is similar to ...

The intensified global warming during grain filling deteriorated rice quality, in particular increasing the frequency of chalky grains which markedly impact market value. The formation of rice quality is a complex process influenced by multiple genes, proteins and physiological metabolic processes. Proteins responsive to stimulus can adjust the ability of ...

Starch, as a main energy storage substance, plays an important role in plant growth and human life. ... In this study, we isolated a rice floury endosperm mutant M14 from a mutant pool induced by 60 Co. Both total starch content and amylose content in M14 seeds significantly decreased, and starch thermal and pasting properties changed.

Caryopsis is an important nutrient storage organ of rice, including seed coat, pericarp, endosperm and embryo. Starch, as the main storage substance of rice caryopsis, accounts for about 80% of the total grain weight and it is composed of amylose and amylopectin which form crystal called starch granule in a certain ratio . In rice caryopsis ...

largest type of storage substance in rice, it is the main source of protein intake for people who consume rice as a staple food. The content and type of RSPs affect the appearance, processing ...

The interconversion of starch and sugar provided energy storage substances in mature seeds and further acted as energy sources to support seed germination and seedling growth. ... Seed restoration is the main method to

repair damaged seagrass meadows because it ... (OsGAPC3) leads to a high germination rate in rice seeds (Tan et al., 2013 ...

In brief, the rice seed structure mainly includes the spikelet hull, seed coat, aleurone layer, embryo, and endosperm (Fig. 2). The size, composition, and quality of these ...

Rice (Oryza sativa L.) is a thermophilic crop and vulnerable to low-temperature stress (LTS) due to its origin in tropical and subtropical regions 1.Current unseasonable temperature variations ...

This review highlights the current knowledge of rice SSP biosynthesis, including a detailed description of the key molecules involved in rice Ssp biosynthetic processes and the major environmental factors affecting S SP biosynthesis. Rice (Oryza sativa L.) is the most important food crop for at least half of the world"s population. Due to improved living ...

Seeds are the major source of nutrient compounds for human and animal livestock worldwide. With the improved living standard, high nutritional quality has become one of the main breeding targets.

Understanding the physiological responses and molecular mechanisms of aging tolerance forms the basis for enhancing seed storability in rice. This review outlines the latest progress in ...

The germination of seeds requires the decomposition of their own stored substances to supply the material base, and energy is required to convert these substances into components of new cells [22] the early stages of germination, an adequate supply of energy helps initiate the life cycle [23].After the seed absorbs water, metabolic processes are ...

A transcriptional regulatory network involving NF-YC12 is demonstrated, which coordinates multiple pathways to regulate endosperm development and the accumulation of storage substances in rice seeds. Abstract Starch and storage proteins, the primary storage substances of cereal endosperm, are a major source of food for humans. However, the ...

Storage starch, synthesized in the seeds, tubers, corms, and roots of plants, is the main substance used by plants to store carbohydrates and is the most important energy source for all living organisms, as well as an important industrial raw material and additive (Zeeman et al., 2010).

RNA-sequencing analysis revealed that in the nf-yc12 mutant genes related to starch biosynthesis and the metabolism of energy reserves were enriched in the down-regulated category. ... which coordinates multiple pathways to regulate endosperm development and the accumulation of storage substances in rice seeds.

2.1 Sucrose Biosynthesis. Sucrose is the major form of carbohydrates which is translocated from source to sink in sieve elements of plants. It is the most ubiquitous and abundant disaccharide

(a-D-glucopyranosyl-v-D-fructofuranoside) in plant tissue which is synthesized from two monosaccharides (a-D-glucopyranose and v-D-fructofuranose) by ...

Sakuranetin plays a key role as a phytoalexin in plant resistance to biotic and abiotic stresses, and possesses diverse health-promoting benefits. However, mature rice seeds do not contain detectable levels of sakuranetin. In the present study, a transgenic rice plant was developed in which the promoter of an endosperm-specific glutelin gene OsGluD-1 drives the ...

Lipids are an important energy storage substance and one of the most important primary metabolites in the human body. We utilized an untargeted metabolomics approach to measure the whole metabolites varieties in two types of rice within a 25-min time frame (Figure 4a). Mass spectrometry can provide information about the molecular weight and ...

seed storability by maintaining seed vigor during storage is important in rice production (Aibara et al. 1986). Multiple "omics" studies have demonstrated that many physiological, cellular, biochemical, and metabolic altera-tions occur during seed storage, and a number of genes related to the storability of rice seeds have been identi-

Statistics show that China"s annual rice production is approximately 500 billion kilograms, and improper seed storage could result in a loss of over 3 % of this production annually. During long-term storage, rice seeds undergo spontaneous physiological changes, including colloidal aging, protein coagulation, and nutrient oxidation.

Long-term storage of crop seeds is critical for the conservation of germplasm resources, ensuring food supply, and supporting sustainable production. Rice, as a major food staple, has a substantial stock for consumption and production worldwide. However, its food value and seed viability tend to decline during storage.

Seeds are one of the most important food sources, providing humans and animals with essential nutrients. These nutrients include carbohydrates, lipids, proteins, vitamins and minerals. Carbohydrates are one of the main energy sources for both plant and animal cells and play a fundamental role in seed development, human nutrition and the food industry. ...

In this review, we highlight the current knowledge of rice SSP biosynthesis, including a detailed description of the key molecules involved in rice SSP biosynthetic processes and the major ...

Introduction. Rice is the foremost food source for nearly half of the global population (Zuo and Li, 2014).The rice endosperm, which is the main storage tissue, is the triploid product of the fertilization of two polar nuclei in the central cell of the embryo sac with one sperm cell nucleus (Sabelli and Larkins, 2009).A fully developed endosperm, which occupies most of ...

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Seed aging is a complex and irreversible process that occurs during seed development and storage. The quality of Allium mongolicum Regel seeds directly impacts its cultivation and production. However, the mechanism of aging seeds in A. mongolicum Regel is not well understood. Germination and physiological indicators were assessed, and RNA-Seq ...

Starch and storage proteins, the primary storage substances of cereal endosperm, are a major source of food for humans. However, the transcriptional regulatory networks of the synthesis and accumulation of storage substances remain largely unknown. Here, we identified a rice endosperm-specific gene, NF-YC12, that encodes a putative nuclear factor-Y transcription ...