

IISR Vajra – A new savour to Indian ginger

This article describes the new variety of ginger, IISR Vajra which has been released and recommended by AICRPS on Spices and Central Sub Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops for commercial cultivation in ginger growing tracts of Kerala, Karnataka, Odisha and West Bengal.

GINGER (*Zingiber officinale* Roscoe), a rhizomatous herbaceous perennial plant belonging to the family Zingiberaceae, is an important spice crop. In India, during 2020-21, ginger is cultivated on an area of 1,75,764 ha with an annual production of 18,84,775 t with productivity of 10.72 t/ha. In India, Madhya Pradesh, Karnataka, Assam, Odisha, West Bengal, and North-eastern states cultivate ginger extensively. Increasing ginger productivity through improved varieties, use of resources to achieve higher yields, while promoting the sustainability of farming systems and progressing from subsistence farming to market-oriented agriculture, are to be developed and adopted.

IISR Vajra

The ICAR-Indian Institute of Spices Research, Kozhikode through its systematic germplasm evaluation programme developed an extra bold and high yielding ginger variety, IISR Vajra, for the benefit of farmers. It is a clonal selection (Acc. 247) from the vast repository of ginger germplasm maintained at the institute.

During 2005-2010, ginger germplasm accessions were evaluated for its bold rhizomes and identified 13 accessions with bold rhizomes. These genotypes along with a released variety IISR Varada were evaluated during 2013-2016 to assess the yield performance under Kerala conditions. The results indicated that in terms of yield, Acc. 247 performed significantly higher compared to the national check. Maximum yield per hectare was recorded in Acc. 247 (26.38 t/ha) followed by Acc 713 (24.43 t/ha) over three years. During 2015-18, this genotype was field tested as Acc. 247 along with other test varieties, for over three years in different ginger growing regions of the country and under various climatic conditions through All India Co-ordinated Research Project on Spices (AICRPS). Among the genotypes evaluated, Acc. 247 recorded 17% increase in yield over national check over three years pooled data. This variety was identified for release during the XXXI All India Coordinated Research Project on Spices (AICRPS) Group Meeting held at ICAR-IISR (Kozhikode, Kerala) in 2020. This variety is notified by Central Sub Committee on Crop Standards, Notification and Release of Varieties for Horticultural Crops (S.O.

CHARACTERISTIC FEATURES OF IISR VAJRA

- High yield potential (26.38 t/ha)
- The rhizome has yellow core, bold and plumpy with medium fibre (5.67%)
- Essential oil (2.15%), oleoresin (7.26%) and dry recovery (20.7%)
- Desirable flavor with high zingiberene (29.83%)
- Suitable for Kerala, Karnataka, Odisha and West Bengal

3254 (E) dated 20 July 2022) for cultivation in Kerala, Karnataka, Odisha and West Bengal states.

Bold rhizomes and yellow core

The rhizome vigour can be harnessed successfully in ginger through selection for developing genotypes with bold rhizomes. IISR Vajra is characterized with bold and plumpy rhizomes suitable for vegetable ginger and for processing industry. It also has characteristic yellow core, which is first of its kind among the released varieties.

Crude fibre

Dried ginger contains 1.5-9.51% crude fibre. Low fibre content is desirable for vegetable ginger and can be exploited for making varied value-added products like sliced ginger, ginger candy, jams, cakes, cookies, etc. IISR Vajra has fibre content of 5.67%, which is considered as low-medium in range.

Zingiberene

The flavour of ginger arises from two distinct groups of chemicals - aroma imparting volatile oils and the non-volatile pungent compounds. The ginger essential oil has high commercial value due to its application in therapeutic and food industries and aromatherapy. About 70 constituents of ginger oil have been characterized. The oil is mostly dominated by the sesquiterpene hydrocarbons, and the major compound was zingiberene (19.28-30.49%). IISR Vajra has most desirable flavour among ginger varieties with high zingiberene of 29.83%.



Rhizome characters of IISR Vajra



IISR Vajra – Rhizomes with yellow inner core colour

Cultivation

Ginger grows well in warm and humid climate, and is cultivated from sea level to an altitude of 1500 m above sea level. Ginger can be grown both under rainfed and irrigated conditions. For successful cultivation of the crop, a moderate rainfall at sowing time till the rhizomes sprout, fairly heavy and well distributed showers during the growing period and dry weather for about a month before harvesting are necessary. Ginger thrives best in well drained soils like sandy loam, clay loam, red loam or lateritic loam. A friable loam rich in humus is ideal. However, being an exhausting crop, it is not desirable to grow ginger in the same soil year after year.

The best time for planting ginger in the West Coast of India is during the first fortnight of May with the receipt of pre-monsoon showers. Under irrigated conditions, it can be planted well in advance during the middle of February or early March. Early planting with the receipt of summer showers results in higher yield and reduces disease incidence.

The land is to be ploughed 4 to 5 times or dug thoroughly with receipt of early summer showers to bring the soil to fine tilth. Beds of about 1 m width, 30 cm height and of convenient length are prepared with an inter-space of 50 cm in between beds. In the case of irrigated crop, ridges are formed 40 cm apart. In areas prone to rhizome rot disease and nematode infestations, solarization of beds for 40 days using transparent polythene sheets is recommended.

Planting

Ginger is propagated by portions of rhizomes known as seed rhizomes. Carefully preserved seed rhizomes are cut into small pieces of 2.5-5.0 cm length, weighing 20-25 g each having one or two good buds. The seed rate varies from region to region and with the method of cultivation adopted. In Kerala, the seed rate varies from 1500 to 1800 kg/ha. At higher altitudes, the seed rate may vary from 2000 to 2500 kg/ha. The seed rhizomes are treated with mancozeb 0.3% (3 g/L of water) for 30 min, shade dried for 3-4 h and planted at a spacing of 20-25 cm along the rows and 20-25 cm between the rows. The seed rhizome bits are placed in shallow pits prepared with a hand hoe and covered with well decomposed farmyard manure and

a thin layer of soil and leveled.

Though transplanting in ginger is not conventional, it is found profitable. A transplanting technique in ginger by using single bud sprouts (about 5 g) has been standardized to produce good quality planting material with reduced cost. The yield level of ginger transplants is at par with conventional planting system. The technique involves raising transplants from single sprout seed rhizomes in the pro-tray and planted in the field after 30-40 days. The advantages of this technology are production of healthy planting materials and reduction in seed rhizome quantity and eventually reduced cost on seeds.

Fertilizer management

At the time of planting, well decomposed cattle manure or compost @ 25-30 t/ha has to be applied either by broadcasting over the beds prior to planting or applied in the pits at the time of planting. Application of neem cake @ 2 t/ha at the time of planting helps in reducing the incidence of rhizome rot disease/ nematode and increasing the yield. As the soil fertility will be varying with the soil type, agroecological conditions or management systems, site specific nutrient management based on the soil test results for major nutrient is advocated. The fertilizers are to be applied in 2 - 3 split doses. Full dose of phosphorus is applied as basal at the time of planting. Equal split doses of N and K is top dressed at 45, 90 (and 120) DAP. In zinc deficient soils, basal application of zinc fertilizer up to 6 kg zinc/ha (30 kg of zinc sulphate/ha) gives good yield. Foliar application of micronutrient mixture specific to ginger is also recommended (dosage @ 5 g/L) twice, 60 and 90 DAP, for higher yield.

Mulching

Mulching the beds with green leaves/organic wastes is essential to prevent soil splashing and erosion of soil due to heavy rain. It also adds organic matter to the soil, checks weed emergence and conserves moisture during the latter part of the cropping season. The first mulching is done at the time of planting with green leaves @ 10-12 tonnes/ha. Application of dried coconut leaves after removing the petiole or paddy straw (2-3 kg/bed) as mulch in ginger is also recommended for effective weed control. Green leaf mulching is to be repeated @ 7.5 tonnes/ha at



Rhizome (immature) characters of IISR Vajra



Field view of IISR Vajra

45 and 90 days after planting, immediately after weeding, application of fertilizers and earthing up.

Irrigation

Ginger is cultivated as rainfed crop in high rainfall areas (uniform distribution for 5 to 7 months) and irrigated crop in less rainfall areas where distribution is not uniform. Ginger requires 1300-1500 mm of water during its crop cycle. The critical stages for irrigation are during germination, rhizome initiation (90 DAP) and rhizome development stages (135 DAP). The first irrigation should be done immediately after planting and subsequent irrigations are given at intervals of 7 to 10 days in conventional irrigation (based on prevailing weather and soil type). Sprinklers and drip system can also be employed for better water-use efficiency and enhanced yield.

Inter cultivation

Weeding is done just before fertilizer application and mulching; 2-3 hand weeding are required depending on the intensity of weed growth. Proper drainage channels are to be provided when there is stagnation of water. Earthing up is essential to prevent exposure of rhizomes and provide sufficient soil volume for free development of rhizomes. It is done at 45 and 90 days after planting immediately after weeding and application of fertilizers.

Disease management

Seed rhizomes are to be selected from disease free gardens, since the disease is seed borne. Treatment of seed rhizomes with mancozeb 0.3% or metalaxyl mancozeb 0.125% for 30 minutes before storage, and once again before planting and drenching at 30 and 60 days after planting reduces the incidence of the disease. Cultural practices such as selection of well drained soils for planting is important, since stagnation of water predisposes the plant to infection. The soil may be solarized before planting by covering the moist soil with a transparent polythene film for 45-50 days. Application of *Trichoderma harzianum* along with neem cake @ 1 kg/bed helps in reducing the incidence of the disease. Once the disease is noticed in the field, removal of affected clumps and drenching the affected and surrounding beds with mancozeb 0.3% or metalaxyl mancozeb 0.125% or copper

oxy chloride 0.2% checks the spread of the disease.

Shoot borer: The shoot borer can be managed by spraying malathion (0.1%) at 21 days intervals during July to October. The spraying is to be initiated when the first symptom of pest attack is seen on the top most leaf in the form of feeding marks on the margins on the pseudostem. An integrated strategy involving pruning and destroying freshly infested pseudostems during July-August (at fortnightly intervals) and spraying malathion (0.1%) during September-October (at monthly intervals) is also effective against the pest.

Harvesting

Ginger attains full maturity in 210-240 days after planting. Harvesting of ginger for vegetable purpose starts after 180 days based on the demand. However, for making dry ginger, the rhizomes are harvested at full maturity when the leaves turn yellow and start drying. Irrigation is stopped one month before harvest and the rhizome clumps are lifted carefully with a spade or digging fork. In large scale cultivations, tractor or power tiller drawn harvesters are also used. The dry leaves, roots and soil adhering on the rhizomes are manually separated. Late harvest is also practiced, as the crop does not deteriorate by leaving it for some months underground.

SUMMARY

IISR Vajra is a high yielding, bold and plumpy rhizome variety. The rhizome has distinct yellow inner core with desirable flavour with high zingiberene. It is suitable for cultivation in Kerala, Karnataka, Odisha and West Bengal. Apart from superior quality characters, it showed 17% higher yield over the National check across locations.

Agriculture Technology Information Centre (ATIC), ICAR-Indian Institute of Spices Research, Kozhikode, Kerala (aticspices@icar.gov.in, 0495-2730704) can be contacted for the quality seed rhizomes of this variety.

For further interaction, please write to:

Dr D. Prasath (Principal Scientist), ICAR-Indian Institute of Spices Research, Kozhikode, Kerala 673 012. *Corresponding author email: Prasath.D@icar.gov.in