

An Introduction to Value and Propagation of Kair

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SUMMARY

Kair (*Capparis decidua*) is a plant of tropic and subtropic area. It has antidiabetic, antibacterial, antifungal, anti-tumor, anti-giardial, antioxidant, anti-inflammatory, hepatoprotective and other medicinal uses. Kair has cross pollination character due to which plants of this species show wide variation in the form of size, morphology, quantity of fruit production per plant, dimorphic character of seeds and in flower colour. The traditional methods (through seedling and root suckers) of propagation for this plant have limitations so an advanced method of propagation like tissue culture is an alternative to overcome propagational limitations and issues like conservation of specific type of plants.

INTRODUCTION

This is a plant of the desert which has limited distribution in the tropical and subtropical areas of Chad, Egypt, Ethiopia, India, Arabia, Pakistan, Iran, Jordan, Mauritania, Niger, Nigeria, Senegal, Somalia, South Africa, Sudan and Egypt. In India it is distributed in Gujarat, western part of Rajasthan, Uttar Pradesh, Madhya Pradesh, Haryana, Punjab and parts of Tamil Nadu, Karnataka and Andhra Pradesh. *Capparis deciduas* (Kair) is a multipurpose medicinal plant of arid zone. This plant is indigenous to desert where it is used as vegetable, pickle and its timber is also termite resistant. Seeds of Kair plant consist of high quality edible oil. Kair having medicinal properties viz. antidiabetic, anthelmintic, antibacterial, antifungal, analgesic, anti-nociceptive, antirheumatic, hypolipidemic, antiatherosclerotic, anti-tumor, anti-giardial, antioxidant, anti-inflammatory, hepatoprotective and anticonvulsant, antiplaque, antihypertensive, purgative and various stomach problems (by killing intestinal worms) can be solved by this plant. Stem and root bark is effective to treating asthma, inflammation, cough due to the presence of isocodonocarpine in them. Root paste of this plant is applicable on scorpion bite. Buds are useful in treatment of boils. Plant is productive in zone 350 mm annual rainfall, it is salt tolerant and its vegetative canopy conserve soil water reserves. Flowering in kair can occur in three seasons first time in February-March second time in July-August and third time in October-November. Fruiting appeared in March-April, May-July in summer. October-November in winter season. Kair fruits have important role in processed products 'panchkutta' and 'pickle' due to which it had attracted market and tourists. Kair covering an area of 3,540 km² piedmont plains in Bikaner and Jodhpur districts of Rajasthan producing fruits annually approximately 7,000 tonnes. Mature fruits of plant is a source of nutrition in rural areas. These are reasons due to which it plays a significant role in the rural economy of peoples of the northwest arid regions of the Indian sub-continent. Because kair is an out breeding species with cross pollination character, which is responsible for genetic variation in next generation progenies. So in nature, plants of this species show wide variation in the form of size, morphology, quantity of fruit production per plant, dimorphic character of seeds and the plant with fruit load from 10 to 90% and with red and yellow flower can be seen but this diversity and population of kair is in declining stage due to rapid urbanization, climate change, overexploitation and change in land use pattern due to which yellow flower based kair plants can hardly be seen in field.

Propagation of Kair:

1) Seedling development and their field level establishment:

This plant is hard to propagate through conventional means of propagation by either seed germination or root suckers. This is due to poor seed viability and problems in establishment of seedling plant in soil. So, plant tissue culture is an alternative to overcome these described limitation to conserving this indigenous plant species of Rajasthan, to fulfill requirements of supplying healthy and desired planting material of kair in bulk.

2) Plant tissue culture of Kair:

The word “tissue culture” originated from hypothesis of ‘totipotency’ which says that all plant cell have an ability to divide and form an unorganized mass of cells called as callus. Totipotency also defined with ability of plant cells to differentiate into any organ and complete plant called organogenesis and clonal propagation respectively.

Advantages of tissue culture in kair:

The problem of root development in seedling plant which is responsible for limitation in field level establishment can be overcome with tissue culture by stimulating root development in large no. of plants through hormonal manipulation of nutrient medium. This is used for mass clonal propagation in limited space and limited time through using very less initiating material of mother plant (desired one). Disease free and virus free plantlets can be produced from tissue culture by using shoot tip as an explant. Tissue culture grown plantlets are uniform in size and growth pattern so it is helpful in forming an uniformly developed plants of kair on fields. Desired material of particular fruit size (large or small size) can be available through tissue culture in large amount for cultivation.

Process of plant tissue culture in kair:

First step is to prepare nutrient medium which is followed by selection of material for explant preparation which must be active with respect to cell division and must be disease free. Preparation of explant followed by their surface sterilization, which is carried out with antifungal and antibacterial agents for further aseptic inoculation of explants in nutrient medium. Further subculturing steps required for shoot multiplication and rooting. After rooting step plantlets are hardened in *ex vitro* conditions and followed by transfer into field.

Challenges of plant tissue culture in kair:

Slow response in explants, limited shoot multiplication and limited root multiplication are challenges of *in vitro* response in kair. Because tissue culture plants grown under specific environmental conditions so they may face difficulties in *ex vitro* conditions during establishment phase. Special care required during selection of explant material otherwise whole propagational material will carry problems of mother plant. There are very few attempts have been made so far for micropropagation of Kair. In India, efforts for successful propagation was done in 1995, 1997 but these efforts were with seedling based explants which has limitations to given rise to true to type plantlets. After these, efforts were carried out for somatic embryogenesis based micropropagation of Kair in 2005 by using shoot tip and node as an explant. So far high callus regeneration efficiency had been reported with inoculating internode and leaf explants in nutrient medium supplemented with plant growth regulators. Sprouting had been reported 12 weeks after inoculation and with 10-15 shoots per explant achieved after inoculation of nodal explants on nutrient medium. Rooting was reported in after 4 weeks of subculture. Hardening was reported greenhouse where researcher used soilrite as a medium.

CONCLUSION:

The supply of healthy and desired planting material in a large quantity is not possible with conventional methods due to limitations in establishment of seedling and limitations of root sucker based planting. Decline in diversity of kair was observed due to overexploitation, rapid urbanization, climate change and change in land use pattern which leads to such situation where kair plants with yellow flower can hardly be seen in the field. So advanced approach of propagation like plant tissue culture can be an alternative to overcome these issues.

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