

Apart from these hymenopterous parasites small red ants, *Monomorium floricola* (Jerdon) were also found preying on 1st instar nymphs of *R. iceryoides* maintained in laboratory culture on pumpkins.

The Authors are thankful to Dr. K. L. Chadha, Project Coordinator (Fruits) & Head, Central Mango Research Station, Lucknow and Dr. G. S. Randhawa, Director, Indian Institute of Horticultural Research, Bangalore for facilities provided. They are also grateful to Dr. B. R. S. Rao, Hymenopterist, Commonwealth Institute of Entomology, London, for identification of the parasites.

Central Mango Research
Station (I.I.H.R.),
Lucknow 226 006 (India),
January 23, 1978.

P. L. TANDON,
BECHE LAL.

1. Abraham, E. V. and Padmanabam, M. D., Pests that damage cacao in Madras. *Indian Hort.*, 1967, 11, 11.
2. Ayyar, T. V. R., Some South Indian Coccids of economic importance (a). *J. Bombay Nat. Hist. Soc.*, 1919, 26(2), 621.
3. Green, E. E., Remarks on Indian scale insects (Coccidae) Part III. *Mem. Dep. Agric. India (Ent. Ser.)*, 1908, 2 (2), 15.
4. Rawat, R. R. and Jakhmola, S. S., Bionomics of the mango coccid, *Rastrococcus iceryoides* Green (Homoptera: Coccidae). *Indian J. Agric. Sci.*, 1970, 40, 140.
5. Shafee, S. A., Alam, S. M. and Agarwal, M. M., Taxonomic survey of Encyrtid Parasites (Hymenoptera: Encyrtidae) in India—*Alig. Mus. Univ. Publ. (Zool Ser.) Ind. Ins. type*, 1975, pp. 245.

“SOFT-WOOD GRAFTING”—A NEW TECHNIQUE FOR HARD WOOD PLANTS

STONE-grafting also known as bench grafting of mango gives nearly hundred per cent success when it is placed in pot and reared in nursery conditions by providing protection against rain and heat^{3,4,5}. However stone grafting of mango *in-situ* under field condition and also stone-grafted plants when placed immediately in the ground for rearing gave a success of 12.3% only in the trials conducted at the various research stations of Gujarat during 1973.

Soft-wood grafting of mango on, *in-situ* grown (one year or more old) mango stocks tried during the 1972 and 1973 at the Anand Campus of Gujarat Agricultural University gave nearly 100% success. In this technique, all the leaves on the stock plants were removed immediately after grafting¹. Though the grafting method gave a very high percentage of success, the survival through summer, nine months later, was rather poor. The technique was therefore modified

during 1974 and 1975 and as a result it is now possible to graft and establish the plant with 100% success by Soft-wood technique *in-situ* wherein all the leaves on stock plants are retained².

The modified technique consists of raising a root stock *in-situ* for one year or more and grafting by wedge method at the site of linearly developing terminal new growth of stock, having bronze coloured leaves and stem. The Scion wood to be used should be defoliated 10 days prior to the grafting and having the same thickness as that of terminal shoot. The graft should be secured firmly using 1.5 cm wide and 45 cm long, 200 gauge polythene strip.

Having obtained 100% success by *in-situ* soft-wood grafting technique in mango, the technique was tried under feeler trial on a few root stocks of some of the fruit plants of one year old and also on large grown-up trees for top working during 1975 and 1976 at the Anand Campus as well as on cultivators' field. The results obtained are given below.

Sr. No.	Name of fruit plant	Number of grafts prepared	Number of successful grafts	Percentage of success
1.	Aonla (<i>Phyllanthus emblica</i> Linn.)	90	66	73.3
2.	*Cashewnut (<i>Anacardium occidentale</i>)	7	5	71.4
3.	Guava (<i>Psidium guajava</i> L.)	294	207	70.7
4.	*Jack fruit (<i>Artocarpus heterophyllus</i>)	6	2	33.3
5.	Phalsa (<i>Grewia asiatica</i>)	67	67	100.0
6.	Sapota (<i>Achras sapota</i> L.) on Rayan or Khirnee (<i>Manihera hexandra</i>) root-stock	72	66	91.6

* Only limited number could be prepared as these are rare fruit plants of the tract.

It has also been demonstrated at the campus and in the fields of cultivators that grown up trees of mango, aonla, rayan, etc., can most easily be converted into any choice variety by periodically dehorning the main limbs of the tree, allowing new soft-shoots to produce and hence grafting these shoots by soft-wood grafting technique.

It is hoped that, this technique, now named as "Soft-Wood grafting" would solve the problems of vegetative propagation and the establishment of the most of the tropical and sub-tropical plants.

The author feels that the same technique of soft-wood grafting with necessary modification in defoliation period and the period for the grafting during the year depending upon the region if tried on tropical crops like nutmeg, clove, coffee, durian, langsat, loquat, litchi, mangosteen, rambutan, avocado, etc., and temperate fruit crops like apple, pear, peach, plum, almond, cherry, apricot, etc., holds the prospects of yielding encouraging results.

Department of Horticulture,
 Gujarat Agricultural University,
 Anand Campus, Anand,
 February 2, 1978.

R. S. AMIN.

1. Amin, R. S., *Haryana J. Hort. Sci.*, 1974, 3 (3 and 4), 160.
2. —, *Ind. J. Hort.*, (In Press.)
3. Bhan, K. C., Sammaddar, H. N. and Yadav, P. S., *Trop. Agri. Trin.*, 1969, 46, 247.
4. Majumdar, P. K. and Rathode, D. S., *Indian Hort.*, 1970, 14 (2), 11.
5. Patel, M. H. and Amin, R. S., *Ind. J. Hort.*, 1976, 33 (2), 156.

CUSCUTA CHINENSIS LAMK. ON ELEUSINE CORACANA GAERTN. (RAGI)—A NEW RECORD

DODDER (*Cuscuta* spp., Convolvulaceae) is a total stem parasite on many plants. In India, *Cuscuta reflexa* Roxb., *C. hyalina* Roth. and *C. chinensis* Lamk. are known to occur as parasites on a number of plants. Among these *C. chinensis* has been reported to infest crops like chilli, niger and bitter gourd in Dharwar region¹ and cowpea in Visakhapatnam region².

In a field at Gandhi Krishi Vignana Kendra (GKVK) of the University of Agricultural Sciences, Bangalore, *C. chinensis* was observed on *Medicago sativa* L. (lucerne) and *Eleusine coracana* Gaertn. (Ragi) (Fig. 1) which were grown in alternate rows. The infestation was found to be very severe on lucerne but not so rigorous on ragi. In the case of the latter, the parasite was found to prefer young stems and leaf sheaths where it produced more number of haustoria. The infested parts of the host first showed the signs of yellowing and then gradually dried up. On the contrary, the parasite thrived well and entered into reproductive phase. The mechanical binding of the young stems of ragi by the parasite also appears to cause some damage to the host.

The fact that *C. chinensis* has not been listed in the "Flora of Bangalore District"³ indicates that it

might be a recent introduction to this area. However, it is the first record of ragi acting as host for any species of *Cuscuta* in general and for *C. chinensis* in particular. Its appearance on lucerne, although reported earlier from elsewhere⁴, is observed in this area for the first time. *C. chinensis* has also been found growing on *Clerodendrum inerme* Gaertn., *Polygonum plebejum* R. Br. and *Delonix regia* Raf. in Hebbal campus of the University of Agricultural Sciences, Bangalore. On *Clerodendrum inerme* Gaertn. it grows gregariously and produces flowers and seeds profusely all round the year.



FIG. 1. *C. chinensis* on Ragi.

The appearance of *Cuscuta* on ragi and lucerne raises problems connected with the control of the parasite.

University of Agricultural
 Sciences, GKVK,
 Bangalore 560 065,
 January 19, 1978.

A. S. KUMARASWAMY,
 J. SYAMASUNDAR,
 S. LINGAPPA,
 G. JAYARAM.

1. Awatageri, M. B., Hosamani, M. M., Setty, R. A. and Vijayakumar, N., *Curr. Res.*, 1975, 4, 47.
2. Suryanarayana Riju, V. and Narasimha Rao, P., *Curr. Sci.*, 1976, 45, 839.
3. Ramaswamy, S. V. and Razi, B. A., *Flora of Bangalore District*, Prastanga, University of Mysore, Mysore, 1973.
4. Tadulingam, C. and Venkatanarayana, G., *A Handbook of Some South Indian Weeds*, Govt. Press, Madras, 1955.