

## INDO-GANGETIC IRRIGATED PLAINS:

**S-1** (Selection-1) is a popular variety of mulberry (*Morus alba* L.) developed in 1970 by selection from seeds collected from Mandalaya (Myanmar/Burma). The variety was widely tested in Eastern India both under irrigated and rain fed conditions and found suitable for silkworm rearing.

- **Plant Type:** Erect, open busty simple, greenish-grey branches,.
- **Leaf:** simple, ovate, smooth, dark green, unlobed, spirally arranged.
- **Ploidy:** Diploid ( $2n=2x=28$ )
- **Days to sprout:** 8-9 days
- **Leaf Moisture:** 78-79 %
- **Sugar:** 44.27 mg g<sup>-1</sup> fr.wt.
- **Protein:** 32.00 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 85-90
- **Leaf yield:** Irrigated: 28-29 t/ha/y Rainfed: 16-18 t/ha/y



S-1

**S-1635** is a popular triploid variety evolved in 1995 by selection from seedlings of open pollinated seeds, collected from the mother plant CSRS-I at CSR&TI, Berhampore, West Bengal. The variety was tested under AICEM: Phase-I and found suitable for cultivation in West Bengal.

- **Plant Type:** Straight and erect stem.
- **Leaf:** green with serrate margin.
- **Ploidy:** Triploid ( $2n=3x=42$ )
- **Days to sprout:** 6-8 days
- **Leaf Moisture:** 80.62 %
- **Sugar:** 48.44 mg g<sup>-1</sup> fr.wt.
- **Protein:** 39.63 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 80-92
- **Leaf yield:** 44- 45 t/ha/y



S-1635

**C-2038** is a pipeline genotype developed in 2007 by crossing between CF-10 x C763. The leaf yield has been recorded 25% more than S-1635. The genotype is under AICEM: Phase-III.

- **Plant Type:** Erect, brown stem
- **Leaf:** large, thick, green,
- **Ploidy:** Diploid, ( $2n=2x=28$ )
- **Days to sprout:** 9-10 days
- **Leaf Moisture:** 79.93%
- **Sugar:** 37.41 mg g<sup>-1</sup> fr.wt
- **Protein:** 31.44 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 79.5
- **Leaf yield:** 54-55 t/ha/year



C-2038

## ACIDIC SOILS OF HILLS AND FOOT HILLS:

**Tr-10** is improved variety developed in 1980 by crossing a tetraploid female parent (T-4) with a diploid male parent Philippine ( $2n$ ). The variety was named Tr-10 as it is triploid variety with  $2n=3X=42$ . The variety was tested and authorized for Eastern hills (rain fed).

- **Plant Type:** erect, dark brown stem
- **Leaf:** entire, green colour
- **Ploidy:** Triploid ( $2n=3x=42$ )
- **Days to sprout:** 8-10 days
- **Leaf Moisture:** 76.30%
- **Sugar:** 36.87 mg g<sup>-1</sup> fr.wt
- **Protein:** 28.99 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 70 -75
- **Leaf yield:** 14-15 mt/ha/y at foot hi



Tr-10

**BC<sub>2</sub>59** is an improved variety developed in 1985 through back crossing between female plant (*Morus indica* Var. Matigara with recurrent parent Kosen. Its performance was confirmed in the AICEM (Phase-I) and authorized for hilly Eastern areas (rain fed). The variety is good for bivoltine silkworm rearing.

- **Plant Type:** Open spreading and drooping type with grey stem
- **Leaf:** simple, entire, dark green, broadly ovate, spirally arranged,
- **Ploidy:** Diploid ( $2n=2x=28$ )
- **Days to sprout:** 12-15 days
- **Leaf Moisture:** 76.62%
- **Sugar:** 37.44 mg g<sup>-1</sup> fr.wt.
- **Protein:** 28.59 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 60-70
- **Leaf yield:** 9-10 mt/ha/y at hills / 15-16 mt/ha/y at foot hills



BC<sub>2</sub>59

**Tr-23** is a pipeline genotype developed in 1988 by conventional crossing between a Tetraploid (T-20) and diploid (S-162) parents. This variety has been identified for acidic soils in hills (pH 4.6) and foot hills (pH 5.2) of West Bengal.

- **Plant Type:** Erect, brown stem
- **Leaf:** large, thick, entire, glabrous,
- **Ploidy:** Triploid, ( $2n=3x=42$ )
- **Days to sprout:** 12-13 days
- **Leaf Moisture:** 79 - 80%
- **Sugar:** 31.50 mg g<sup>-1</sup> fr.wt.
- **Protein:** 25.44 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 73 - 76
- **Leaf yield:** 14-15 t/ha/y at hills / 24-25 t/ha/y at foot hills



Tr-23

## DROUGHT PRONE AREAS:

**C-1730** is an improved mulberry variety developed by crossing a tetraploid female (T-25) with a diploid male parent (S-162). The variety was tested under AICEM-Phase-II and found suitable for drought prone areas of rainfed and laterite soil of West Bengal, Orissa and Madhya Pradesh.

- **Plant Type:** Erect, brown stem.
- **Leaf:** thick, green, serrate margin
- **Ploidy:** Triploid, ( $2n=3X=42$ )
- **Days to sprout:** 7-9
- **Leaf Moisture:** 80.97%
- **Sugar:** 45.62 mg g<sup>-1</sup> fr.wt.
- **Protein:** 34.40 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 85.71
- **Leaf yield:** 15-16 t/ha/year



C-1730

## FLOOD PRONE AREA:

**C-2028** is an improved mulberry genotype developed in 1989 by crossing between China White x S-1532 suitable for water logged condition. Frequent inundation of mulberry crop in stagnated flood water in major sericulture areas of West Bengal affects both the leaf quality and quantity.

- **Plant Type:** Erect, spreading,
- **Leaf:** entire, glossy, green, smooth and shining.
- **Ploidy:** Diploid, ( $2n=28$ )
- **Days to sprout:** 9-10 days
- **Leaf Moisture:** 77.26%
- **Sugar:** 41.56 mg g<sup>-1</sup> fr.wt.
- **Protein:** 28.93 mg g<sup>-1</sup> fr.wt.
- **Rooting %:** 78
- **Leaf yield:** 35-36 t/ha/year



C-2028

## SALINE SOILS:

**C-776** is salt tolerant variety developed in 1998 by hybridization between *M. multicaulis* x Black cherry. It can withstand salinity stress up to an EC of 7.8 mhos / cm through *in vitro* screening following by field study.

- **Plant Type:** Erect, branches straight, stem brown in colour.
- **Leaf:** simple, green, serrate margin, oblong and acute apex.
- **Ploidy:** Diploid ( $2n=2x=28$ )
- **Leaf yield:** 25-26 t/ha/year.



C-776

Raw silk production greatly depends on productivity and quality of mulberry leaf. The systematic leaf productivity and quality improvement research conducted on mulberry at Central Sericultural Research and Training Institute (CSR&TI), Berhampore, West Bengal led to develop a series of high yielding varieties to cater the need of the sericultural farmers of Eastern and North-Eastern regions of India. Out of 15 broad agro climatic zones of India, three broad regions viz., Eastern Himalayan Region (Zone-II), Lower Gangetic Plain Region (Zone-III) and Eastern Plateau & Hilly Region (Zone VIII) falls under West Bengal.

### Major sericulture regions of West Bengal:

#### 1. Indo-Gangetic Irrigated plains:

This area is characterized by alluvial loamy soil with mildly acidic to neutral in reaction (pH 5.2 to 7.0) favours luxuriant growth of mulberry. High temperature in summer (>35° C) and low temperature during winter (<13° C) with >1200 mm precipitation.

#### 2. Acidic soils of hills and foot hills:

This area is characterized by the presence of brown forest soil which is sandy to clay loam in texture with pH 3.5 to 6.2. High humidity, less sunshine hours, poor soil depth and quality limits mulberry productivity. Annual precipitation is very high (>2000 mm) but distributed only in 3-4 months creating moisture-stress in non-rainy period.

#### 3. Rainfed water stress and laterite soils:

The area is characterized by the presence of red lateritic soil which is sandy to sandy loam in texture with pH slightly acidic (5.5 – 6.2). Extremely high temperature during summer (>42° C) and poor rainfall (<1100 mm) with low moisture holding capacity and poor nutrient status limit crop productivity.

#### 4. Flood prone area:

The major silk producing districts of West Bengal are often inundated by flood water from the river Ganges results in water stagnation for 30-35 days.

#### 5. Salinity affected areas:

This area is characterized by medium range of salinity (EC value of < 9.0 dsm<sup>-1</sup>) particularly in South 24-Parganas

Mulberry is a deep rooted, perennial, hardy plant capable of thriving well under diverse agro-climatic conditions. It is grown as a bush under intensive cultivation practices and propagated vegetatively through saplings. In west Bengal, pit system of plantation during post monsoon (October-November) for irrigated plains, onset of monsoon (June-July) for rainfed areas and pre monsoon (May-June) for hilly areas, is ideal for high survival and quick establishment of plants. First pruning of new plantation was done after 6 months (irrigated condition) or 12 months (under rainfed) after establishment. Generally rearing initiated 30-45 days after pruning and completed within 70 days.

### Mulberry Crop Season:

No. of crop: 5 under irrigated region and 3 in rainfed areas

### Date of Pruning & Brushing (commercial):

Crop	Date of Pruning	Date of Brushing	Days to obtain chawki leaves
Chaitra (Jan-Feb)	1 <sup>st</sup> December	26 <sup>th</sup> January	57
Baisakhi (Mar-Apr)	20 <sup>th</sup> February	28 <sup>th</sup> March	36
Shravani (Jun-Jul)	11 <sup>th</sup> May	20 <sup>th</sup> June	48
Aswina (Aug-Sep)	21 <sup>st</sup> July	29 <sup>th</sup> August	39
Agrahayani (Oct-Nov)	19 <sup>th</sup> September	31 <sup>st</sup> October	42

### Manure and Fertilizer application:

FYM to be applied two times, during pre-monsoon and post-monsoon well mixed with soil by digging or ploughing followed by preparation of ridges and furrows. Chemical fertilizers in the form of N: P: K :: 336:180:112 kg<sup>-1</sup> ha<sup>-1</sup> year to be applied on 22<sup>nd</sup> day after pruning in 5 split doses under irrigated condition.

.Unit land area	Dose of FYM [2 splits]	Dose of Urea [5 splits]	Dose of SSP [5 splits]	Dose of MOP [5 splits]
Ha/year	20.00 mt	730.0 kg	1125.0 kg	186.00 kg
Split dose	10.00 mt	146.0 kg	225.00 kg	37.20 kg
Acre/year	08.00 mt	295.0 kg	455.00kg	75.30 kg
Split dose	04.00 mt	59.00 kg	91.00 kg	15.06 kg
Bigha/year	02.66 mt	97.33 kg	150.00 kg	24.80 kg
Split dose	01.33 mt	19.46 kg	30.00 kg	4.96 kg
Katha/year	133.0 kg	4.865 kg	7.50 kg	1.24 kg
Split dose	066.5 kg	0.973 kg	1.50 kg	0.25 kg

### For rainfed and Hilly areas:

10 tons FYM and Chemical fertilizers in the form of N: P: K: 150: 50:5 kg<sup>-1</sup> ha<sup>-1</sup> year to be applied on 22<sup>nd</sup> day after pruning in 3 split doses.

### Irrigation:

Irrigation @3.75 ha cm irrigation water once in 7-10 days by ridges-furrows method (85,000 gallons of water / ha each time).

### Plant protection measures:

Mulberry is intensively cultivated crop, favours several foliar diseases and pest, causes loss in leaf yield, besides deterioration of the quality. An appropriate plant protection measure has to be carried out depending upon incidence and severity.

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## MULBERRY VARIETIES SUITABLE FOR DIFFERENT AGRO-CLIMATIC ZONES OF WEST BENGAL



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Sericulture, an agro-based cottage industry in India and provides employment and livelihood to rural & tribal masses. CSR&TI, Berhampore, a premier research institute under Central silk board (CSB), Ministry of Textiles (GOI) provides technical, technological and training support for the development of sericulture and silk industry in Eastern and North-Eastern India.

In West Bengal mulberry cultivation is distributed from the hilly region to plain lands up to sea level, covering very wide range of situations, viz., rainfed, flood prone, acidic and saline soils, hill terrains, etc. but the highest production comes from the irrigated Gangetic plains. Due to horizontal expansion of mulberry in traditional and non-traditional Districts of West Bengal, it is imperative to develop high yielding genotypes specific to a particular agro-climatic zone. The mulberry in West Bengal covers ~ 15,153 hectare with total raw silk production stands 2450 tonnes (2014-15).