Collection:
Leaves, stem bark and wood of the plant *Pterospermum acerifolium* Willd. (Sterculiaceae) was collected from Nasik (M. S.) during the flowering stage of the plant.

Plant material was collected as per standard procedure. Infected parts were carefully discarded from plant sample. Samples were thoroughly washed with water to remove adhered particles and debris and dried in shade. Dried material was then packed in plastic bags.

Authentication:
The plant was first authenticated by Dr. S. M. Mahajan, Head of Botany Department, K.T.H.M. College of Arts, Commerce and Science, Nasik. Then it was authenticated by T. Chakraborty, Scientist-D for Joint Director, Botanical Survey of India, Koregaon road, Pune by comparing morphological features. The herbarium of the plant specimen was deposited at Botanical Survey of India, Pune; with the voucher specimen number RASPTA1. (Reference number-BSI/WRC/Tech/2009/671).

Preparation and storage
The dried leaves, stem bark and wood were powdered by using pulveriser and passed through sieve no. 20. Powder materials were stored in airtight containers until used.

Principal Conclusions
The present work was carried out on the leaves, bark and wood of *Pterospermum acerifolium* (Sterculiaceae). Emphasis was given on pharmacognostic, phytochemical and pharmacological investigation of *Pterospermum acerifolium* leaves, bark and wood.

Pharmacognostic investigation
The morphological studies revealed that the fresh leaves of *Pterospermum acerifolium* were observed to be with linear Stipules; robust petiole. Leaves are nearly orbicular or oblong, sometimes ± lobed, 24–34 × 14–29 cm, leathery, abaxially densely yellowish and gray stellate velutinous, adaxially hairy or glabrous. Base is cordate with entire crenate margin, truncate apex, nearly rounded, or pointed. Microscopic studies of leaves showed the presence of polygonal and nearly isodiametric or irregular in outline with

Pharmacognostic, phytochemical and pharmacological investigation on *Pterospermum acerifolium* WILLD. (Sterculiaceae)
straight wall epidermal cells, presence of stellate trichomes and four armed trichomes. Stellate trichome is the identifying characteristic of this leaf as well as of this family. Stomata is anomocytic in nature. The mean stomatal number is 31.4, vein islet number is 9, vein termination is 13.

➢ The morphological studies revealed that the bark has dark brown color externally whereas pale brown to buff internally with a glabrescent texture and characteristic odour. Longitudinal wrinkles are present on outer surface. Microscopic evaluation revealed the following zones as periderm, secondary phloem (Collapsed phloem and Non-collapsed phloem), prismatic calcium oxalate crystals, and starch grains.

➢ The morphological studies of wood showed yellowish coloration. Microscopic evaluation revealed the presence of following zones as xylem, medullary rays and prismatic calcium oxalate crystal.

➢ Ash values are helpful in determining the quality and purity of crude drugs in powdered form. The total ash usually consists of inorganic radicals like carbonates, phosphates and silicates of sodium, potassium, magnesium, and calcium.

➢ Extractive values are useful for evaluation of crude drugs and gives an idea about the nature of chemical constituents present in them.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Plant part used</th>
<th>Solvent used</th>
<th>Extractive Value (% w/w)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Leaf</td>
<td>Petroleum ether (40 – 60 °C)</td>
<td>2.1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td>Chloroform</td>
<td>1.45</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td>Ethyl acetate</td>
<td>1.25</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td>Methanol</td>
<td>8.24</td>
</tr>
<tr>
<td>5</td>
<td>Bark</td>
<td>Petroleum ether (40 – 60 °C)</td>
<td>1.29</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td>Chloroform</td>
<td>2.06</td>
</tr>
<tr>
<td>7</td>
<td></td>
<td>Ethyl acetate</td>
<td>4.94</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td>Methanol</td>
<td>9.12</td>
</tr>
<tr>
<td>9</td>
<td>Wood</td>
<td>Petroleum ether (40 – 60 °C)</td>
<td>0.99</td>
</tr>
<tr>
<td>10</td>
<td></td>
<td>Chloroform</td>
<td>1.07</td>
</tr>
</tbody>
</table>

Pharmacognostic, phytochemical and pharmacological investigation on *Pterospermum acerifolium* WILLD. (Sterculiaceae)
Alcohol soluble extractive value was found to be greater than petroleum ether soluble extractive value; it indicates that bark contains maximum polar compounds that can be extractive maximum into alcohol.

The extracts obtained after extraction was characterized by preliminary phytochemical test for rough ideas of main constituents present in extracts.

<table>
<thead>
<tr>
<th>Test for active constituents</th>
<th>Petroleum ether extract</th>
<th>Chloroform extract</th>
<th>Ethyl acetate Extract</th>
<th>Methanol extract</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Leaf</td>
<td>Bark</td>
<td>Wood</td>
<td>Leaf</td>
</tr>
<tr>
<td>Steroids</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Triterpenes</td>
<td>+</td>
<td>+</td>
<td>+</td>
<td>-</td>
</tr>
<tr>
<td>Flavonoids</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Glycosides</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Tannins</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

Petroleum ether extract showed presence of steroidal compounds, triterpenes and hydrocarbons. Ethyl acetate extract showed presence of flavonoid compounds. Flavonoid, glycosides and tannins were found in methanol extract.

Phytochemical investigation

Thin layer chromatography technique was carried out for characterization of different extracts. Different solvent systems were used for TLC of different extracts. The solvent systems which are more effective for separation of the compounds they are mentioned below.

Acetic acid: Chloroform (3:7), Ethyl acetate: Benzene (9:1), 15% acetic acid in water was used solvent system to characterization of phenolic compound and tannins. Acetic acid: n-butanol: water (1:4:5) Ethyl acetate: formic acid:
GAA: water (10:1.1:1.1:26) was used solvent system to characterization of flavonoids. Hexane and Chloroform in different proportion was used as solvent system for steroids.

- β-sitosterol, Lupeol, apigenin and d-quercitol was isolated from unsaponifiable petroleum ether extract of leaves.
- Quercetin, dihydrokaempferol, gallic acid and ellagic acid were isolated from bark.
- Dihydroquercetin, kaempferol and rutin were isolated from wood.
- Isolated compounds were confirmed by IR, GC-MS, \(^1\)H NMR, \(^1\)C NMR, HPTLC data.
- Quantification of rutin, gallic acid and quercetin in leaves, bark and wood of *Pterospermum acerifolium* by planner chromatography.
- Validation and method development for rutin and gallic acid. Linearity, precision and recovery study was carried out for its routine analysis.
Pharmacological investigation

- **Animals**
  Albino rats (100-120 g) and Swiss mice (20–30 g) of either sex were used. Animals were randomly assigned to groups and maintained in plastic boxes at controlled room temperature (25–28 °C) with free access to food and water, under a 12 hrs light and 12 hrs dark cycle. All the experimental procedures were carried out during the light period of the day (11:00 a.m. to 02:00 p.m.)

- **Acute Toxicity Study**
  Acute oral toxicity was performed in mice by following Organization for Economic Cooperation and Development (OECD) guidelines 425. In the acute toxicity study, extracts of leaves, bark and wood of *P. acerifolium* did not produce any mortality even at the highest tested dose 2000 mg/kg, p.o. during the 24 hour period. There was no change in the gross behavior also. The three doses (100, 200 and 400 mg/kg, i.p.) of extracts were selected for further pharmacological studies.

- **Analgesic activity**
  Analgesic activity was evaluated by using different models like hot plate model, acetic acid induced pain, formalin induced pain, capsaicin induced paw licking sodium chloride induced eye wiping and tail immersion method. These models are used to evaluate centrally acting as well as peripherally acting drugs. Various extracts are evaluated for central and peripheral analgesic activity. Among all the extracts of *P. acerifolium* USPEL, EAPAB and EAPAW shown significant central and peripheral analgesic activity.

- **Anti-inflammatory activity**
  Anti-inflammatory activity was evaluated by acute inflammation model, carrageenan induced rat paw edema and subchronic inflammation model formalin induced arthritis. USPEL, EAPAB and EAPAW significantly (p<0.05) inhibited the inflammation in rat paw edema.

- **Antioxidant activity**
  Antioxidant activity was performed by using DPPH assay, nitric oxide scavenging assay, hydroxyl radicals scavenging assay and Super oxide radical scavenging assay. In all extracts EAPAB and TMPAB (20-100 µg/ml)
showed strong antioxidant activity, and is comparable to standard Ascorbic acid. The antioxidant effect of ethyl acetate extract and total methanol extract may be due to the phenolic components.

- **Streptozotocin induced diabetes**
  Streptozotocin induced diabetics model was used to evaluate antidiabetic activity. We can conclude that EAPAB has beneficial effects on blood glucose level. It has the potential to impart therapeutic effect in diabetes. Administration of EAPAB and TMPAB and glibenclamide increased the activities of GPx and GST in diabetic conditions. SOD and catalase are two major scavenging enzymes that remove the toxic-free radical in vivo. Reduced activities of SOD in erythrocytes and catalase have been observed during diabetes and this may result in a number of deleterious effects due to the accumulation of superoxide radicals and hydrogen peroxide. EAPAB TMPAB and glibenclamide-treated rats showed decreased LPO that is associated with increased activity of SOD and catalase. The results obtained thus suggest that EAPAB possesses potent antidiabetic and antioxidant activity.

- **Antiulcer activity**
  Aspirin induced ulcer, ethanol induced ulcer and pylorus ligated ulcer model was used to evaluate antiulcer activity. TMPAB has shown a substantial and significant protection against gastric ulcers in all the models. This protective effect might have been mediated by both anti-secretory and cytoprotective mechanisms. Moreover, further insight into the precise mechanism of action is essential to exploit the complete potency of TMPAB and increase its usage in contemporary medicine.