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# ANNEXES

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## ANNEX 1

## FLORAL CALENDARS OF DIFFERENT DISTRICTS OF MAHARASHTRA STATE

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>AHMEDNAGAR</b>																								
<i>Cajanus cajan</i> (ज्वरो)																								
<i>Carthamus tinctorius</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कावजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Elusina coracana</i> (रागी)																								
<i>Emblca officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Pongamia pinnata</i> (करंज)																								
<i>Psidium guajava</i> (अमरुद)																								
Pulses (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Syzgium cumini</i> (जामून)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडुव)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेर)																								

Major Pollen



Minor Pollen



Minor Nector



Major Nector



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>AKOLA</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Capparis</i> sp.																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Carum capiticum</i> (ओवा)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कावजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Emblia officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Prosopis juliflora</i> (वेडी बाभूळ)																								
<i>Psidium guvaja</i> (अमरुद)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेर)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>AMRAVATI</b>																								
<i>Buchanania chinensis</i> (चारोळी)																								
<i>Butea monosperma</i> (पळस)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Capparis</i> sp.																								
<i>Carthamus tinctorius</i> (कुसुम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embolia officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
Pulses (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Syzgium cumini</i> (जामून)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>AURANGABAD</b>																								
<i>Aegle marmelos</i> (बेल)																								
<i>Butea monosperma</i> (पखस)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Carthamus tinctorious</i> (कुसुम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कावजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Emblica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Pongamia pinnata</i> (करंज)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nectar

Minor Nectar

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>BEED</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Embellica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शेदी)																								
<i>Psidium guajava</i> (अमरुद)																								
Pulses (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nectar

Minor Nectar

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>BHANDARA</b>																								
<i>Bombax ceiba</i> (सिमल)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cassia auriculata</i> (टाकला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Lagerstroemia parviflora</i> (बेन्द्रा)																								
<i>Madhuca latifolia</i> (महुआ)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Schleichers oleosa</i> (कसुम)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Strychnos potatorum</i> (निर्मली)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>BULDHANA</b>																								
<i>Bombax ceiba</i> (सिमल)																								
<i>Buchanania chinensis</i> (चारोली)																								
<i>Butea monosperma</i> (पछस)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Carthamus tinctorious</i> (कुसुम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Dichrostachys cinaneria</i>																								
<i>Embellica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अमुर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>CHANDRAPUR</b>																								
<i>Adina cordifolia</i> (हेदडी)																								
<i>Bombax ceiba</i> (सिमल)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cassia auriculata</i> (टाकला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कावजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Coriandrum sativum</i> (धनिया)																								
<i>Embllica officinalis</i> (आवली)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Lagerstroemia parviflora</i> (बेन्द्रा)																								
<i>Madhuca latifolia</i> (महुआ)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pterocarpus marsupium</i> (बिबल)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>DHULE</b>																								
<i>Cajanus cajan</i> (ज्वरो)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Elusina coracana</i> (रागी)																								
<i>Embolica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Pongamia pinnata</i> (करंज)																								
<i>Psidium guvaja</i> (अमरूद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वर)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंबूर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>GADCHIROLI</b>																								
<i>Adina cordifolia</i> (हेदडी)																								
<i>Bombax ceiba</i> (सिमल)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cassia auriculata</i> (टाकला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कावजी निंबू)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Lagerstroemia parviflora</i> (बेन्द्रा)																								
<i>Madhuca latifolia</i> (महुआ)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरूद)																								
<i>Pterocarpus marsupium</i> (बिबल)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Pollen



Minor Pollen



Minor Nector



Major Nector



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>GONDIYA</b>																								
<i>Adina cordifolia</i> (हेदडी)																								
<i>Bombax ceiba</i> (सिमल)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cassia auriculata</i> (टाकला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कावजी निंबू)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Lagerstroemia parviflora</i> (बेन्द्रा)																								
<i>Madhuca latifolia</i> (महुआ)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरूद)																								
Pulses (कडधान्य)																								
<i>Schleichers oleosa</i> (कसूम)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>HINGOLI</b>																								
<i>Aegle marmelos</i> (बेल)																								
<i>Butea monosperma</i> (पळस)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Carthamus tinctorious</i> (कुसुम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>JALGAON</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embolica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Pongamia pinnata</i> (करंज)																								
<i>Psidium guajava</i> (अमरूद)																								
<i>Sesamum indicum</i> (नील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेर)																								

Major Pollen      Minor Pollen      Minor Nector      Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>JALNA</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अमुर)																								
<i>Zea mays</i> (मकई)																								

Major Nector

Minor Nector

Minor Pollen

Major Pollen



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>KOLHAPUR</b>																								
<i>Cajanus cajan</i> (ज्वरो)																								
<i>Catunareghum spinosa</i> (गेला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Elusina coracana</i> (रागी)																								
<i>Embellica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतीलो)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Lagerstroemia parviflora</i> (बेन्दा)																								
<i>Memocylon umbellatum</i> (अंजनी)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia bellirica</i> (भरडा)																								
<i>Terminalia chebula</i> (हिरडा)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडुद)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>LATUR</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Parkinsonia aculeata</i> (अदन्ति)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Prosopis juliflora</i> (वेडी बाभूळ)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडुद)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>NAGPUR</b>																								
<i>Bombax ceiba</i> (सिमल)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cucurbita</i> spp.																								
<i>Emblca officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरूद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेर)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>NANDED</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorius</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Pollen



Minor Pollen



Minor Nector



Major Nector



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>NANDURBAR</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Elusina coracana</i> (रागी)																								
<i>Emblia officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफल)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Pongamia pinnata</i> (करंज)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Syzygium cumini</i> (जामून)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेरा)																								

Major Pollen

Minor Pollen

Major Nectar

Minor Nectar

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>NASHIK</b>																								
<i>Cajanus cajan</i> (ज्वरो)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Elusina coracana</i> (रागी)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Oogenia ougenensis</i> (तिवस)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Syzygium cumini</i> (जामून)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>OSMANABAD</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embellica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Parkinsonia aculeata</i> (अदन्ति)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Prosopis juliflora</i> (जेडी बाभूळ)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Nector

Minor Nector

Minor Pollen

Major Pollen

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>PARBHANI</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorius</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cucurbita</i> spp.																								
<i>Embluca officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शेदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Nectar

Minor Nectar

Minor Pollen

Major Pollen



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>PUNE</b>																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Carthamus tinctorius</i> (कसुमा)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Cosmos</i> spp. (कॉस्मोस)																								
<i>Cyanotis</i> spp. (इंद्रा)																								
<i>Delonix regia</i> (गुलमोहर)																								
<i>Elusina coracana</i> (रागी)																								
<i>Emblica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलागिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Peltophorum pterocarpum</i> (सोनमोहर)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Pongamia pinnata</i> (करंजी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Nector

Minor Nector

Minor Pollen

Major Pollen

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>RAIGAD</b>																								
<i>Areca catachu</i> (सुपारी)																								
<i>Artocarpus</i> (फणस)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Delonix regia</i> (गुलमोहर)																								
<i>Elusina coracana</i> (रागी)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Memocylon umbellatum</i> (अजनी)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Psidium guvaja</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Terminalia bellirica</i> (भरडा)																								
<i>Terminelia chebula</i> (हिरडा)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Pollen

Minor Pollen

Major Nector

Minor Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>RATNAGIRI</b>																								
<i>Areca catachu</i> (सपारी)																								
<i>Artocarpus</i> (फणस)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Delonix regia</i> (गुलमोहर)																								
<i>Elusina coracana</i> (रागी)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामलील)																								
<i>Hevea brasiliensis</i> (रबर)																								
<i>Memocylon umbellatum</i> (अंजनी)																								
<i>Musa paradisisca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pulses</i> (कडधान्य)																								
<i>Terminalia bellirica</i> (भरडा)																								
<i>Terminelia chebula</i> (हिरडा)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								

Major Nector

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Major Pollen

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>SANGLI</b>																								
<i>Actinodaphne angustifolia</i> (पिसा)																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorius</i> (कुसुम)																								
<i>Catunareghum spinosa</i> (गला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Elusina coracana</i> (रागी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Memocylon umbellatum</i> (अंजनी)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Terminalia bellirica</i> (भरडा)																								
<i>Terminalia chebula</i> (हिरडा)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेर)																								

Major Pollen

Minor Pollen

Minor Nector

Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>SATARA</b>																								
<i>Actinodaphne angustifolia</i> (पिसा)																								
<i>Areca catachu</i> (सुपारी)																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Carthamus tinctorious</i> (कुसुम)																								
<i>Catunareghum spinosa</i> (गला)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Elusina coracana</i> (रागी)																								
<i>Emblina officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Memocylon umbellatum</i> (अंजनी)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia bellirica</i> (भरडा)																								
<i>Terminalia chebula</i> (हिरडा)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Vitis vinifera</i> (अमुर)																								
<i>Zea mays</i> (मकई)																								

Major Nector

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Major Pollen

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>SINDHUDURG</b>																								
<i>Areca catachu</i> (सुपारी)																								
<i>Artocarpus</i> (फणस)																								
<i>Citrus aurantifolia</i> (काजी निंबू)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Delonix regia</i> (गुलमोहर)																								
<i>Elusina coracana</i> (रागी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Memocylon umbellatum</i> (अंजनी)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Psidium guvaja</i> (अमरूद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Terminalia bellirica</i> (भरडा)																								
<i>Terminalia chebula</i> (हिरडा)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Zea mays</i> (मकई)																								

Major Nector

Minor Nector

Minor Pollen

Major Pollen



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>SOLAPUR</b>																								
<i>Cajanus cajan</i> (ज्वरो)																								
<i>Carthamus tinctorious</i> (कसूम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cocos nucifera</i> (नारियल)																								
<i>Embellica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Guizotia abyssinica</i> (रामतील)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Pongamia pinnata</i> (करज)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तील)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Terminalia elliptica</i> (रेन)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								
<i>Vitis vinifera</i> (अंगूर)																								
<i>Zea mays</i> (मकई)																								

Major Pollen Minor Pollen Minor Nector Major Nector

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>THANE</b>																								
<i>Artocarpus (फणस)</i>																								
<i>Cajanus cajan (दुवर)</i>																								
<i>Cicer arietinum (चना)</i>																								
<i>Cocos nucifera (नारियल)</i>																								
<i>Delonix regia (गुलमोहर)</i>																								
<i>Elusina coracana (रागी)</i>																								
<i>Eucalyptus spp. (निलगिरी)</i>																								
<i>Guizotia abyssinica (रामतील)</i>																								
<i>Lagerstroemia parviflora (बेन्द्रा)</i>																								
<i>Memocylon umbellatum (अंजनी)</i>																								
<i>Musa paradisiaca (केला)</i>																								
<i>Oryza sativa (चावल)</i>																								
<i>Pulses (कडधान्य)</i>																								
<i>Sesamum indicum (तील)</i>																								
<i>Terminalia bellirica (भुरडा)</i>																								
<i>Terminalia chebula (हिरडा)</i>																								
<i>Vigna mungo (मूंग)</i>																								
<i>Vigna radiata (उडद)</i>																								
<i>Zea mays (मकई)</i>																								

Major Nector

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Major Pollen



District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>WARDHA</b>																								
<i>Cajanus cajan</i> (ज्वार)																								
<i>Capparis</i> sp.																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Cucurbita</i> spp.																								
<i>Emblia officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guvaja</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उड़द)																								

Major Pollen

Minor Pollen

Major Nector

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District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>WASHIM</b>																								
<i>Cajanus cajan</i> (ज्वरो)																								
<i>Capparis</i> sp.																								
<i>Carthamus tinctorious</i> (कुसुम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफूल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisiaca</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Prosopis juliflora</i> (जेजी बाभूळ)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Vitis vinifera</i> (अमुर)																								
<i>Zea mays</i> (मकई)																								

Major Nector

Minor Nector

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Major Pollen

District	Jan		Feb		Mar		Apr		May		June		July		Aug		Sep		Oct		Nov		Dec	
	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N
<b>YEOTMAL</b>																								
<i>Azadirachta indica</i> (कड़लिंबो)																								
<i>Cajanus cajan</i> (तुवर)																								
<i>Carthamus tinctorious</i> (कुसुम)																								
<i>Cicer arietinum</i> (चना)																								
<i>Citrus aurantifolia</i> (कागजी निंबू)																								
<i>Citrus reticulata</i> (संत्रा)																								
<i>Citrus sinensis</i> (मोसंबी)																								
<i>Embllica officinalis</i> (आवला)																								
<i>Eucalyptus</i> spp. (निलगिरी)																								
<i>Helianthus annuus</i> (सूर्यफल)																								
<i>Moringa oleifera</i> (शेवगा)																								
<i>Musa paradisaica</i> (केला)																								
<i>Oryza sativa</i> (चावल)																								
<i>Pennisetum typhoides</i> (बाजरा)																								
<i>Phoenix sylvestris</i> (शिंदी)																								
<i>Psidium guajava</i> (अमरुद)																								
<i>Pulses</i> (कडधान्य)																								
<i>Sesamum indicum</i> (तिल)																								
<i>Sorghum vulgare</i> (ज्वार)																								
<i>Strychnos potatorum</i> (निर्मली)																								
<i>Syzygium cumini</i> (जामून)																								
<i>Tamarindus indica</i> (इमली)																								
<i>Vigna mungo</i> (मूंग)																								
<i>Vigna radiata</i> (उडद)																								
<i>Zea mays</i> (मकई)																								
<i>Ziziphus</i> spp. (बेर)																								

Major Pollen

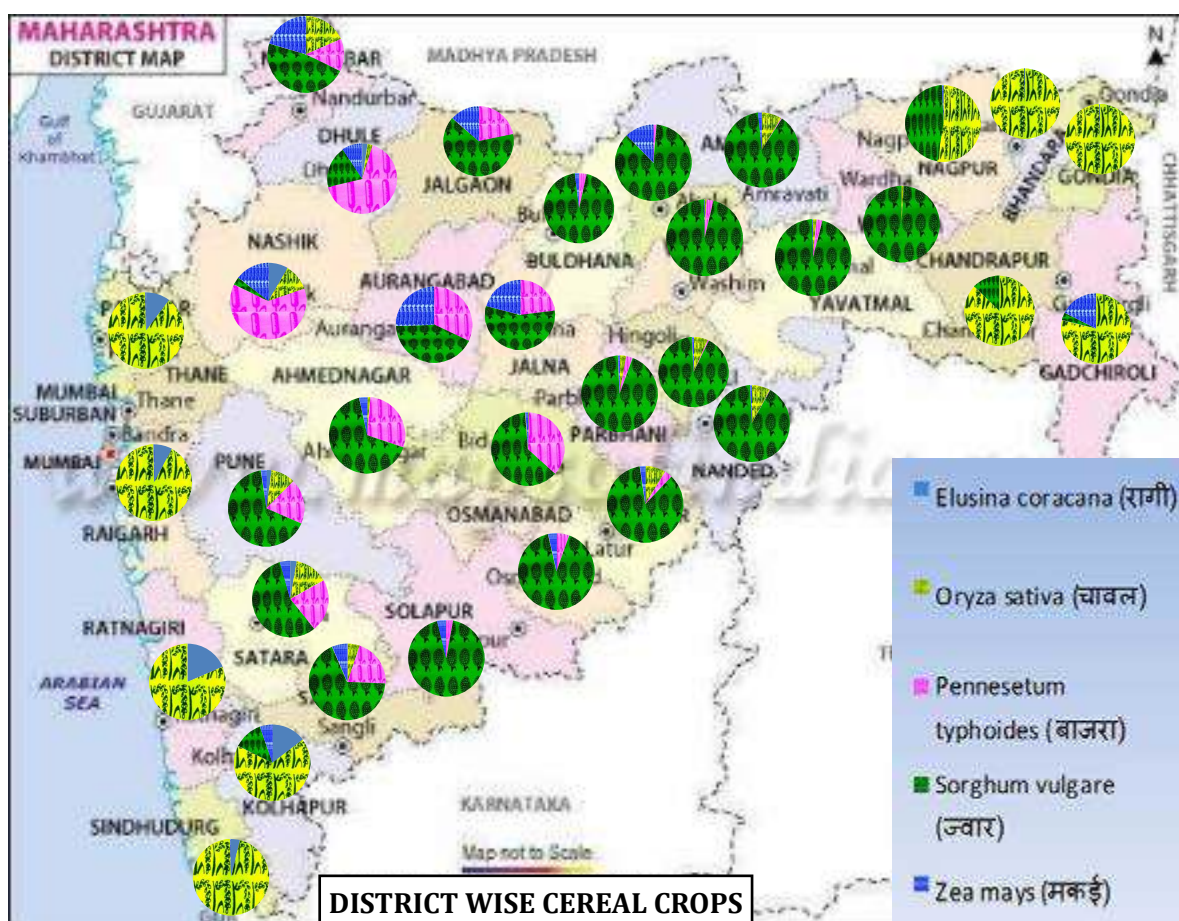
Minor Pollen

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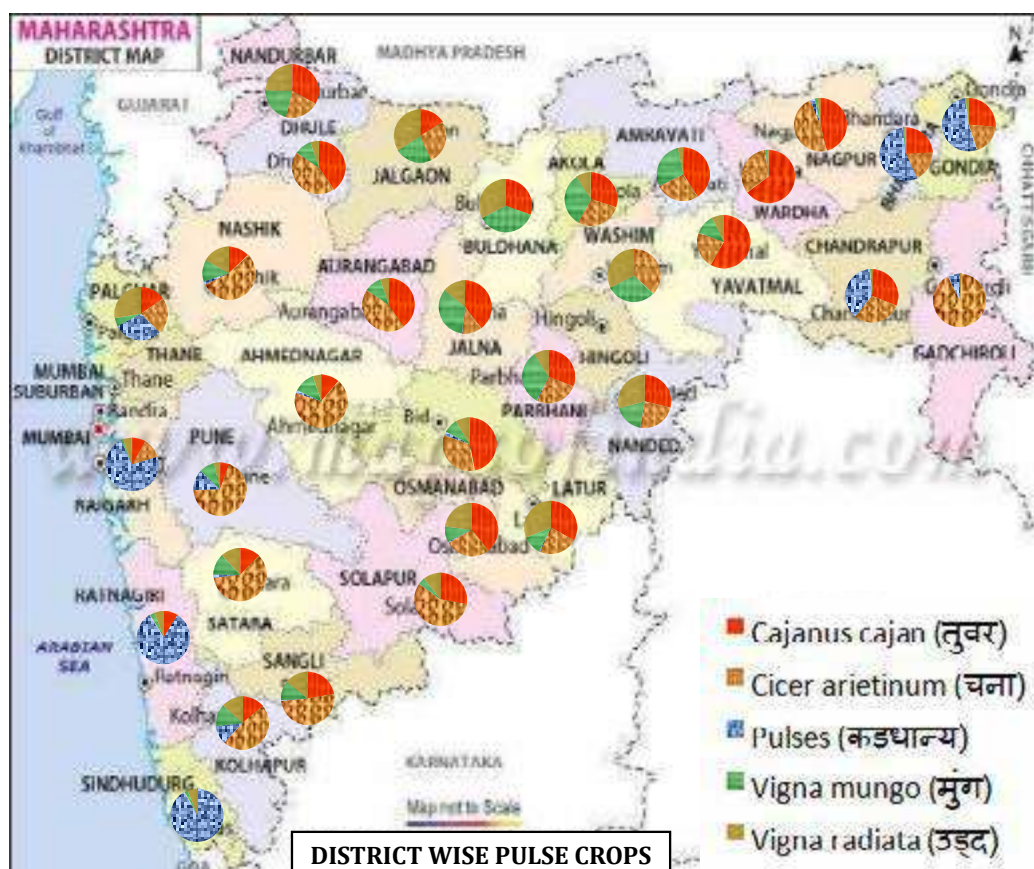
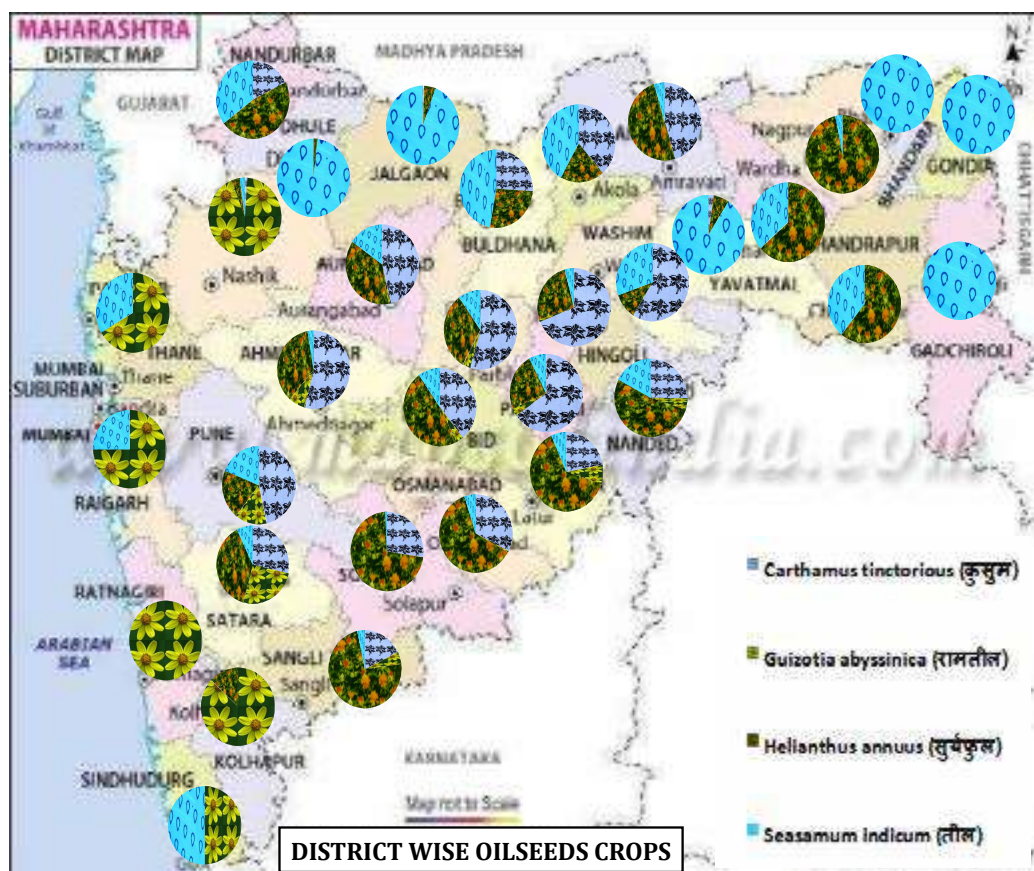
Major Nector

## ANNEX 2

### DISTRICT MAPS OF MAHARASHTRA STATE SHOWING MAJOR CEREAL, OILSEED AND PULSE GROWING AREAS









## ANNEX 3

**Government of India**  
**Economic Advisory Council to the Prime Minister**  
**NITI Aayog, Sansad Marg, New Delhi - 110 001**

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No. EAC-PM/Bee Keeping/Committee/2018

28<sup>th</sup> May 2018

### OFFICE MEMORANDUM

**Subject: Constitution of "Beekeeping Development Committee" under the Chairmanship of Dr Bibek Debroy, Chairman, EAC-PM**

India has vast potential for Beekeeping. The diversity in flora and fauna provides more opportunities for the development of beekeeping industry. Compared to the potential, not even the fringe of it in terms of number of honeybee colonies is achieved. There is thus great potential and opportunities for the development of beekeeping industry in the country. While several measures have been taken by the National Bee Board (NBB), no significant results seem to be coming forth in achieving Sweet Revolution for food, nutritional and livelihood security through Beekeeping. Hence, there is a need for an Apex Body like the Economic Advisory Council to the Prime Minister (EAC-PM) to take lead in promoting and coordinating activities involved in Beekeeping industry so that "Sweet/Golden Revolution" in the country could be achieved.

2. In this regard, it has been decided to constitute "Beekeeping Development Committee" under the Chairmanship of Dr Bibek Debroy, Chairman, EAC-PM with the following Terms of Reference:

- i. To suggest measures for overall development of Scientific Beekeeping in the country and quality production of honey and other beehive products;
- ii. To identify issues concerning various Ministries/Departments/Organisations/Agencies involved in Beekeeping and suggest measures to resolve them;
- iii. To coordinate, promote, sponsor and support research, extension and development programme in Beekeeping in the country as an essential input for agricultural production;
- iv. To study the domestic & International markets/trade for honey & other beehive products and suggest strategy for promoting production and marketing of quality honey and other beehive products in the country, in a Mission Mode approach;
- v. To suggest post-harvest management measures and infrastructural development for beehive products viz. honey, bee pollen, propolis, bee wax, royal jelly, etc.; and
- vi. Any other matter concerning with the development of Beekeeping industry.

3. Following is the composition of the "Beekeeping Development Committee":

- |  |   |                 |
|--|---|-----------------|
| 1) Dr Bibek Debroy, Chairman, EAC-PM   | - | Chairman        |
| 2) Shri Ratan P. Watal, Member Secretary, EAC-PM   | - | Member          |
| 3) Shri K. Rajeswara Rao, Advisor, EAC-PM  | - | Member Convener |
| 4) Shri J.P. Mishra, Adviser (Agriculture), NITI Aayog   | - | Member          |
| 5) Shri B.L. Saraswat, ED, National Bee Board (NBB),<br>Dept. of Agriculture Cooperation & Farmers Welfare | - | Member          |
| 6) Representative of Food Safety and Standards Authority<br>of India (FSSAI)                               | - | Member          |
| 7) Representative from Tamil Nadu Agricultural University,<br>Coimbatore                                   | - | Member          |
| 8) Shri Devvrat Sharma, Beekeeping Industry Expert   | - | Member          |

Ms Vedanta Dhamija, Young Professional (YP), EAC-PM will also be associated with the above Committee. The Committee may adopt any other expert as its Member.

4. The Committee shall finalise its report by 31<sup>st</sup> January 2019.

  
(K. Rajeswara Rao)  
Adviser (EAC-PM)

**Distribution:**

1. Dr Bibek Debroy, Chairman, EAC-PM
2. Shri Ratan P. Watal, Member Secretary, EAC-PM
3. Shri K. Rajeswara Rao, Advisor, EAC-PM
4. Shri J.P. Mishra, Adviser (Agriculture), NITI Aayog
5. Shri B.L. Saraswat, ED, National Bee Board (NBB), Dept. of Agriculture Cooperation & Farmers Welfare
6. Shri Ashish Bahuguna, Chairman, Food Safety and Standards Authority of India (FSSAI) - with a request to nominate your representative to be Member of the above Committee
7. Dr K. Ramasamy, Vice Chancellor, Tamil Nadu Agricultural University, Coimbatore (Fax No. 0422-2431672) - with a request to nominate your representative to be Member of the above Committee
8. Shri Devvrat Sharma, Beekeeping Industry Expert, 144-A, Pocket-A, Dilshad Garden, Delhi - 110 095

## ANNEX 4

**Government of India**  
**Economic Advisory Council to the Prime Minister (EAC-PM)**  
**NITI Aayog Bhawan, Parliament Street, New Delhi-110 001**

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**Record note of discussions held during the meeting of the Beekeeping Development Committee under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on June 6, 2018 in EAC-PM at NITI Aayog Bhawan, New Delhi**

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1. Meeting of the Beekeeping Development Committee under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM was held on June 6, 2018 in EAC-PM at NITI Aayog Bhawan, New Delhi. List of participants is enclosed.
2. Welcoming the participants, Dr. Bibek Debroy, Chairman, EAC-PM briefed about the rationale for constituting the 'Beekeeping Development Committee' in order to achieve the Sweet/Golden Revolution in the country. He emphasized the need for the Committee to meet regularly and deliberate at length to produce a rigorous report that suggests actual implementable policies that the Government can adopt to support beekeeping in the country.
3. Shri Ratan P. Watal, Member Secretary, EAC-PM referred to the Terms of Reference of the Committee and stated that the major tasks would be to (i) examine the existing legal framework for removing the ambiguity, (ii) improve statistics pertaining to beekeeping in the country, (iii) improve standards, and (iv) remove impediments that are affecting marketing of bee products. He suggested that a 'Bee Census' could be initiated in the country. Dr. M.R. Srinivasan, Professor of Agricultural Entomology, Tamil Nadu Agricultural University, Coimbatore added that the statistics on beekeepers may also be procured from Krishi Vigyan Kendras in various Agricultural Universities and with support from Indian Council of Agricultural Research (ICAR).
4. Shri Devvrat Sharma, Beekeeping Industry Expert made a presentation covering the current state of beekeeping, benefits associated with beekeeping, problems faced by the beekeepers and plausible solutions, and possible course of action by various Ministries to support beekeeping in the country. Shri Sharma made another presentation on 'A Model Project on Empowerment of Rural Women through Beekeeping'. He suggested that this model project could be first implemented in select States, through convergence under various Government schemes, which could generate an annual income of about Rs.67,750 per person from ten colonies cumulatively.
5. Thereafter, detailed deliberations were held regarding the initiatives being taken by National Bee Board (NBB), status of revising the standards by FSSAI, promoting R&D in



beekeeping, coordination between the crop breeders, agronomists and entomologists to develop scientific techniques for crop specific beekeeping, need for stepping up extension services in beekeeping, need to promote standardization of equipment used by public and private players for beekeeping, and need to address the issue of price volatility in the international market that the beekeepers are confronted with. It was felt that there is a need to devise unique ways to address the price volatility issue of honey and move beyond the MSP to look at other effective measures such as Price Stabilization Fund.

6. To a query, Dr. B.L. Sarswat, ED, NBB informed that a new scheme entitled “National Beekeeping & Honey Mission (NBHM)” for an amount of Rs.300 crore for two years (2018-19 & 2019-20) as a Central Sector Scheme prepared by NBB, DAC&FW, was referred to the Department of Expenditure (DoE), Ministry of Finance. Dr. Sarswat further added that, DoE have given “In principle” approval for implementation of this scheme as a centrally Sponsored Scheme and the final approval is awaited. Shri Ratan P. Watal, Member Secretary, EAC-PM mentioned that this issue may be settled by discussing with the representative of the DoE, who may be invited to attend the Committee meeting in future.
7. Concluding the discussions, Dr. Bibek Debroy, Chairman, EAC-PM and Chairman of the Committee decided that Sub-Committees under the overall guidance/convenorship of EAC-PM may take up the TOR of the Committee as per the following and submit reports in a time bound manner:

Sub-Committee : 1 Dr. M.R. Srinivasan to take lead w.r.t. (i) “Suggesting measures for overall development of Scientific Beekeeping in the country and quality production of honey and other beehive products”, (ii) “Coordinating, promoting, sponsoring and supporting research, extension and development programme in Beekeeping in the country as an essential input for agricultural production” and (iii) “Suggesting post-harvest management measures and infrastructural development for beehive products viz. honey, bee pollen, propolis, bee wax, royal jelly, etc”.

Sub-Committee : 2 Dr. B.L. Sarswat to take lead w.r.t. (i) “Identifying issues concerning various Ministries/Departments/Organisations/ Agencies involved in Beekeeping and suggesting measures to resolve them” and (ii) “Studying the domestic & International markets/trade for honey & other beehive products and suggesting strategy for promoting production and marketing of quality honey and other beehive products in the country, in a Mission Mode approach”. This Sub-Group shall also look into the legal framework, data collection, Bee census, etc. •

8. Dr. Srinivasan and Dr. Sarswat were advised to inform Adviser, EAC-PM and Convenor of the Committee the names of their respective Sub-Committee Members urgently. It was decided that the representative(s) from concerned organisations like ICAR may also be included in the Sub-Committees.
9. Dr. Debroy and Shri Watal advised that the Sub-Committees/Committee meetings may be held in different parts of the country covering all the regions and interact with the representatives of the Beekeeping farmers and industry to get first hand information from them about the problems being faced by them so that the Committee could recommend remedial measures to remove those problems for development of the Beekeeping industry.

It was decided that Dr M.R. Srinivasan will coordinate with Krishi Vigyan Kendras in the concerned Agricultural Universities of different regions and organize these meetings in consultation with Shri K. Rajeswara Rao, Adviser, EAC-PM and Convenor of the Committee. Dr. Debroy, Chairman and Shri Watal, Member of the Committee will also attend such meetings.

10. Concluding the discussions, Dr. Bibek Debroy desired that the Sub-Committees may submit their reports within one to two months' time.
11. Meeting ended with a 'Vote of Thanks' to the Chair.

**Meeting of the Beekeeping Development Committee under the Chairmanship of  
Dr. Bibek Debroy, Chairman, EAC-PM held on June 6, 2018  
in EAC-PM at NITI Aayog Bhawan, New Delhi**

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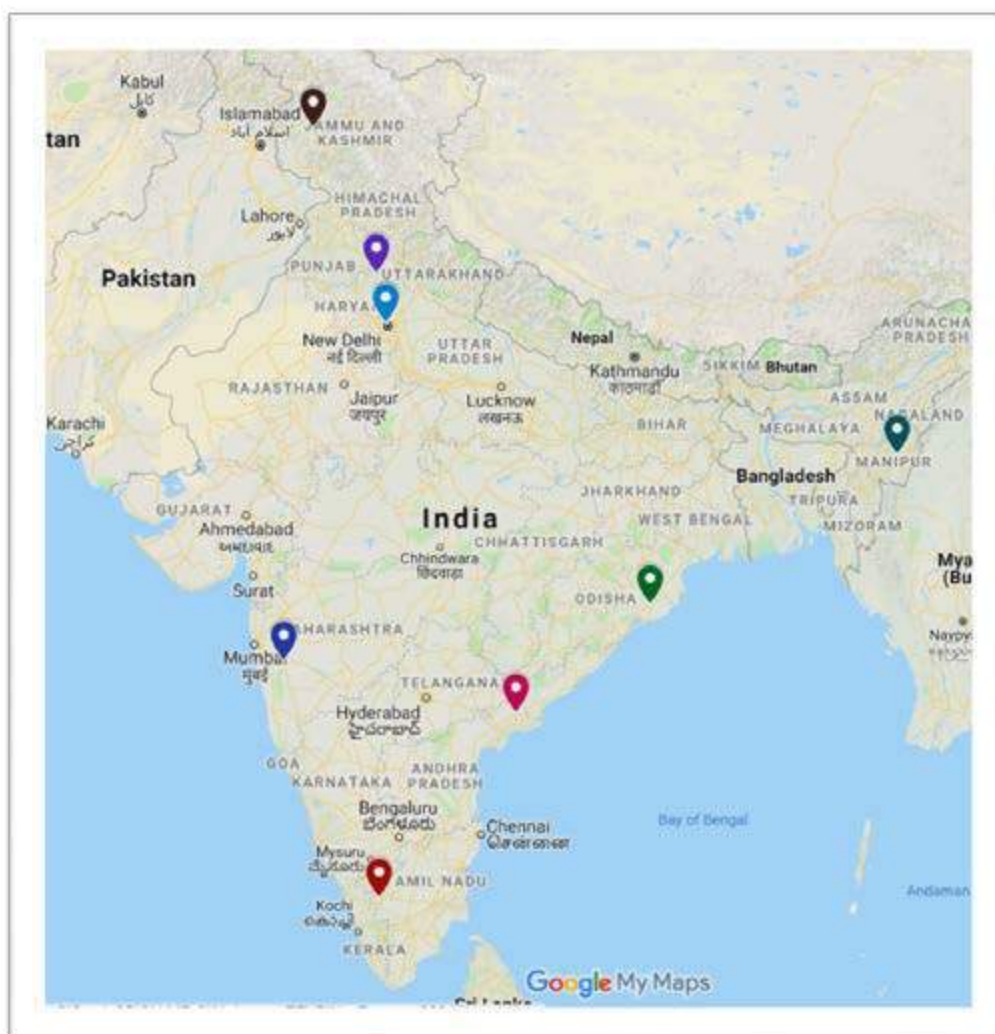
**List of Participants**

1. Dr. Bibek Debroy, Chairman, EAC-PM & Chairman of the Committee -In Chair
2. Shri Ratan P. Watal, Member Secretary, EAC-PM & Member of the Committee
3. Shri K. Rajeswara Rao, Advisor, EAC-PM & Member Convener of the Committee
4. Ms Vedanta Dhamija, Young Professional, EAC-PM
5. Shri Diwakar Zhurani, Young Professional, EAC-PM
6. Dr. B.L. Sarswat, Executive Director, National Bee Board, DAC&FW & Member of the Committee
7. Dr. M.R. Srinivasan, Professor of Agricultural Entomology, Tamil Nadu Agricultural University & Member of the Committee
8. Dr. A.C. Mishra, Joint Director, FSSAI & Member of the Committee
9. Dr. Kavitha Ramaswamy, Scientist IV(3), FSSAI
10. Shri Manash Choudhary, Joint Advisor, NITI Aayog & Member of the Committee representing Adviser, NITI Aayog
11. Shri Devvrat Sharma, Beekeeping Expert, HNPL & Member of the Committee

## ANNEX 5

### LOCATIONS AT WHICH STAKE HOLDER CONSULTATION MEETINGS WERE HELD IN DIFFERENT REGIONS OF INDIA

-  NITI Aayog New Delhi
-  IARI, New Delhi
-  TNAU, Coimbatore
-  Ramnagar, Kurukshetra
-  Central Agricultural University, Imphal
-  CBRTI, Pune
-  Dr.Y.S.R. Horticultural University, VR Gudem
-  Sher-e-Kashmir University of Agricultural S.
-  Krushi Bhavan, Bhubaneswar





## ANNEX 6

**Government of India  
Economic Advisory Council to the Prime Minister  
NITI Aayog Bhawan, Parliament Street, New Delhi-110 001**

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**Record note of discussions held during the meeting of Beekeeping Development Sub-committee -I under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM  
on 18<sup>th</sup> July 2018 at IARI, New Delhi**

1. Economic Advisory Council to the Prime Minister (EAC-PM) constituted the “Beekeeping Development Committee” under the Chairmanship of Dr. Bibek Debroy, Chairman, Economic Advisory Council to the Prime Minister (EAC-PM). During its meeting held on 6<sup>th</sup> June 2018, this Committee decided to set up two Sub-Committees, Sub-Committee: 1 under the convenership of Dr. M.R. Srinivasan, Professor of Entomology, Tamil Nadu Agricultural University and Sub Committee: 2 under the convenership of Dr. B.L. Sarswat, Executive Director, National Bee Board, Ministry of Agriculture Cooperation & Farmers Welfare.
2. First meeting of the Beekeeping Development Sub-Committee: 1 was held on 18<sup>th</sup> July 2018 at the Conference Hall of the Division of Entomology, Indian Agricultural Research Institute (IARI), New Delhi under the Chairmanship of Dr. Bibek Debroy. Dr. M.R. Srinivasan, Professor, TNAU, Coimbatore convened the meeting with the support of Dr. V.V. Ramamurthy, Ex-Professor, IARI, New Delhi, who made elaborate arrangements for the meeting.
3. Before the start of the meeting, Dr. Ramamurthy took Dr. Bibek Debroy accompanied by Shri Ratan P. Watal, Member Secretary, EAC-PM, Shri K. Rajeswara Rao, Adviser, EACPM and other dignitaries/experts to the century old PUSA collection of insects and the modernized insect biosystematics unit. They also visited the taxonomically, arranged insects of various orders including the honey bees and pollinators. Live honey bee colonies of *Apis mellifera* were also displayed by ICAR-AICRP Honey Bee team. The entomologists implementing the National Bee Board (NBB) sponsored Integrated Beekeeping Development Centre (IBDC) at IARI displayed the facilities created under the project for providing training to farmers and beekeepers.
4. There after, Dr. Subhash Chander, Professor, Division of Entomology, IARI, New Delhi welcomed the participants of the meeting.
5. In his opening remarks, Dr. Bibek Debroy, Chairman, EAC-PM & Chairman, Bee Keeping Development Committee (BDC) stated that the BDC must come out with recommendations that will improve beekeeping by tweaking the existing system while keeping up with Government of India policy of doubling farmers’ income by 2022. Hence, he emphasised the need that the two Sub-Committees set up by the BDC must deliberate in that direction and submit their recommendations.

6. Shri Ratan P. Watal, Member Secretary, EAC-PM informed that beekeeping is an important occupation for people in India and at least four Chief Ministers spoke about the importance of beekeeping in their respective States during the recently held Governing Council meeting of NITI Aayog, which was chaired by the Prime Minister. He also requested the Members of the Beekeeping Development Sub-Committees to deliberate, brainstorm and come up with a report that will help BDC to finalise its report suggesting improvements in beekeeping in short term as well as long term and that such report be useful and spoken for at least next 10 years ensuring that the successive Governments implement the same.
7. Dr. M.R. Srinivasan, Convener of the Sub-Committee: 1 of the BDC presented the status and prospects of beekeeping in India in respect of the following terms of reference of the sub-committee:
  - (i) Suggesting measures for overall development of Scientific Beekeeping in the country and quality production of honey and other beehive products
  - (ii) Coordinating, promoting, sponsoring and supporting research, extension and development programme in Beekeeping in the country as an essential input for agricultural production
  - (iii) Suggesting post-harvest management measures and infrastructural development for beehive products viz. honey, bee pollen, propolis, bee wax, royal jelly, etc.
- 7.1 Dr. Srinivasan informed that the presentation was made based on the answers obtained for a questionnaire covering the ToR of the sub-committee, which was circulated to about 40 beekeeping experts across the country that included scientists, beekeepers, bee hive manufacturers, honey traders and other stake holders.
- 7.2 During his presentation, Dr. Srinivasan explained various aspects of beekeeping development including, current figures of honey production in the country in comparison to other nations, States in India that are leading in honey production, types of honey bees reared, research needs, availability of honey bees, bee hives and beekeeping equipment, problems faced by beekeepers, standards and quality control with respect to honey and bee products, promotion of honey, honey price, marketing and export, role of honey bees as pollinator and crop yield improvement, infrastructure availability and requirement for processing, storing of honey and bee products at national, state and district levels.
- 7.3 While defining roles of various organizations involved in beekeeping development in India, it was suggested that NBB currently operating with funds from Mission for Integrated Development of Horticulture (MIDH) can be made into an independent agency with sufficient funding and man power and can be the central agency in bee governance in the nation, which can have regional offices in the States. It can operate like other commodity boards such as Silk Board and Coffee Board with people from government and private organizations involved in research and commerce. ICAR-AICRP on Honey Bees and Pollinators currently catering to the research needs in beekeeping and pollination can be upgraded to the status of National Research Centre and must have sub centres based on

niche areas of research. KVIC under the Ministry of MSME and KVIB in State Governments can work in coordination with NBB. Central Bee Research and Training Centre (CBRTI), Pune which is a unit of KVIC can conduct its research, in tandem with ICAR. Other agencies namely APEDA, FSSAI, Skill Council, forest and tribal welfare will be coordinated by NBB on aspects of honey and beekeeping.

8. Dr. Bibek Debroy, Chairman, EAC-PM opined that there is a need to get correct data on honey production and requested Dr. B.L. Sarswat, Executive Director, NBB to get correct data of honey production and the number of bee hives in various States through a reliable mechanism. He also requested that legal and scientific definition of honey be found out from literature.
9. Dr. B.L. Sarswat, ED, NBB highlighted the issues to be addressed in beekeeping in India. He said that development of quality nucleus hives of *A. cerana indica*, *A. mellifera* was of prime importance. He further added that there is a need for establishing bee disease diagnostic laboratory. He informed that the IBDC sponsored by NBB caters to the above said needs in various States. He also emphasized the need for quality standards and testing laboratory for bee products such as royal jelly, propolis and bee venom some of which are considered costlier than gold and hold good market potential in the international arena.
10. Dr. V.V. Ramamurthy, Ex-Professor of Entomology, IARI emphasized the need for a new beekeeping framework in India. He pointed out that scientific approach in beekeeping is important to achieve success and this can be made possible by bringing together the efforts of entomologists working in various State Agricultural Universities and ICAR.
11. Dr. D.P. Abrol, Dean of Sher-e-Kashmir University of Agriculture and Technology, Jammu, who is also a renowned beekeeping scientist informed that lack of extension of beekeeping techniques is an area to be addressed. He also informed that Pollinator initiatives have been started world over such as International, African, North American, Oceania, Brazilian and UK insect pollinator Initiatives. He suggested that India and ICAR must become member of such international pollinator initiatives and projects.
12. Dr. R.C. Mishra, former project coordinator of AICRP on Honey Bees and Pollinators emphasized the need for an umbrella organization to raise the overall level of Apiculture in India. He stated that Quality Control laboratories for honey that charge nominal testing fees is the need of the hour. He also stated that at present there are multiple standards for honey such as FSSAI, Agmark, etc and suggested that the committee shall emphasise the need for a single standard.
13. Shri Manash Choudhury, Joint Advisor, NITI Aayog suggested that the outcome of the discussions must be from economic perspective: He said that there is no need to give more emphasis to technical aspects. He suggested, that the Sub-Committee must list the drivers of apicultural growth. The existing infrastructure and up-scaling must be examined. Low cost and high cost innovations and interventions must be spelt out. Bee governance at national level must be made possible. He further suggested to examine how existing programmes such as Saansad Adarsh Gram Yojana (SAGY), National Rural Livelihood Mission (NRLM), Krishi Kalyan Abhiyan (KKA), etc. can be utilised to take the fruits of beekeeping to the end-users.



14. Shri. Devvrat Sharma, one of the leading beekeepers in India spoke on the need for conducting an International beekeeping industry exhibition in India. He said the hybrid seeds released recently, particularly of mustard crop are not suitable for pollinators as they are of short duration and it must be ensured that the newly released varieties are suitable for pollinators. He said that agencies such as APEDA, Export Inspection Council, which are involved in export of honey, may also be invited for such meetings.
15. Dr. Deep Varma, Director, Central Bee Research and Training Institute (CBRTI), KVIC, Pune said that honey is a commodity similar to milk and it involves the coordinated effort of people in many ministries and departments. He appreciated the current effort of EAC-PM in bringing all agencies together for beekeeping .development. Dr. Lakshmi Rao, Assistant Director, CBRTI, Pune explained the efforts taken by their organisation in preparing region-wise floral calendar and requested NBB or any other funding agency to grant funds to them in documenting the floral calendars.
16. Shri Yogeshwar Singh, Beekeeping expert and bee enthusiast, who was formerly ED of NBB spoke on the need for recognising honey bees as an input in agriculture and thus prevent the decline of pollinators. He suggested that the existing NBB is functioning without a framework and cabinet approval. Hence, he suggested that the NBB must be reorganised similar to other commodity boards.
17. Dr. Subramanian, S. Principal Scientist, Division of Entomology, IARI, New Delhi made a presentation explaining the facilities available at the NBB-IBDC centre of IARI and its future plans.
18. Shri K. Rajeswara Rao, Adviser, EAC-PM in his concluding remarks appreciated the efforts of the organisers and requested the Convener to start preparing the report based on the discussions and suggestions emerged during the meeting. He suggested that the draft report could be updated based on the discussions and suggestions during the future meetings to be held in other regions. It was suggested that the next meeting may be held at TNAU, Coimbatore for which, officials from Department of Agriculture, Horticulture and KVIB from Southern States, some of the members of the Sub-Committee, leading Beekeepers and Scientists from Tamil Nadu/South India may also be invited.
19. Meeting ended with a 'Vote of Thanks' to the Chair by Dr. Kumaranag, K.M., Scientist, AICRP on HB &P, IARI, New Delhi .

**Meeting of the Beekeeping Development Sub-Committee: 1 under the  
Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM  
held on 18<sup>th</sup> July, 2018 at IARI New Delhi**

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**List of Participants**

1. Dr. Bibek Debroy, Chairman, EAC-PM & Chairman, Beekeeping Development Committee
2. Shri Ratan P. Watal, Member Secretary, EAC-PM
3. Shri. K. Rajeswara Rao, Adviser, EAC-PM
4. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore & Convener, Beekeeping Development Sub-Committee: 1
5. Dr. B.N.S. Murthy, Horticulture Commissioner, MoA&FW, New Delhi
6. Dr. B.L. Sarswat, Executive Director, National Bee Board, MoA&FW, New Delhi
7. Dr. D.P. Abrol, Dean, Faculty of Agriculture, SKUAST, Jammu
8. Shri Manash Choudhary, Joint Advisor, NITI Aayog
9. Dr. Deep Varma, Director, Central Bee Research and Training Institute, KVIC, Pune
10. Dr. K. Lakshmi Rao, Assistant Director, CBRTI, KVIC, Pune
11. Dr. R.C. Mishra, Fonner Project Coordinator, AICRP, Honey Bees and Pollinators
12. Shri Devvrat Sharma, Beekeeping Expert
13. Shri Yogeshwar Singh, Beekeeping Expert
14. Dr. V.V. Ramamurthy, Ex-Professor, IARI, New Delhi
15. Dr. Subhash Chander, Professor, Division ofEntomology, IARI, New.Delhi
16. Dr. S. Subramanian, Principal Scientist. Division ofEntomology, IARI, New Delhi
17. Dr. Kumaranag, K.M. Scientist, AICRP on HB &P, IARI, New Delhi
18. Ms Vedanta Dhamija, Young Professional, EAC-PM

## ANNEX 7

**Government of India  
Economic Advisory Council to the Prime Minister  
(EAC-PM) NITI Aayog Bhawan, Parliament Street, New Delhi-110 001**

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**Record note of discussions held during second meeting of the Beekeeping Development Sub-Committee : 1 under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on 5<sup>th</sup> September 2018 at Tamil Nadu Agricultural University, Coimbatore**

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Second meeting of the Beekeeping Development Sub-Committee: I covering Southern Region States was held under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on 5<sup>th</sup> September 2018 at 11.00 AM at Tamil Nadu Agricultural University (TNAU), Coimbatore. Dr. K. Ramasamy, Vice-Chancellor, TNAU welcomed Dr. Debroy, Shri Ratan P. Watal, Member Secretary, EAC-PM, Shri K. Rajeswara Rao, Adviser, EAC-PM and dignitaries/delegates to the meeting. List of participants is enclosed.

2. Dr. M.R. Srinivasan, Convener of the Sub-Committee: 1 made a presentation with reference to the following Terms of Reference of the Sub-Committee:
  - (i) Suggesting measures for overall development of Scientific Beekeeping in the country and quality production of honey and other beehive products
  - (ii) Coordinating, promoting, sponsoring and supporting research, extension and development programme in Beekeeping in the country as an essential input for agricultural production
  - (iii) Suggesting post-harvest management measures and infrastructural development for beehive products viz. honey, bee pollen, propolis, bee wax, royal jelly, etc.
3. During his presentation, Dr. Srinivasan gave data on honey production in India and compared the production details of various Indian States. It was pointed out that Tamil Nadu, the leading honey producer in India till 1990s lost out in the race due to virus disease of Indian honey bee (*Apis cerana indica*). It was during this time the Italian honey bee (*Apis mellifera ligustica*) got successfully establishment in northern India. Even today, the Marthandam honey (Marthandam is situated in Kanyakurnari district of Tamil Nadu) is the major contributor to honey production in South India. Dr. Srinivasan analyzed the problems faced by honey industry and beekeepers as under:
  - India has an abysmally low per capita honey consumption of 0.02 kg annually compared to 1.70 kg in Austria and many European nations and 0.53 kg in USA.
  - Reduced awareness of goodness of honey among Indian public could be one of the major reasons for low demand for honey in India.

- In spite of low local demand, production and export of honey has increased in the last two decades, thanks to the interventions of the Indian Government through scientific approach with the help of Indian Council of Agricultural Research (ICAR), Central/ State Agricultural Universities (CAUs and SAUs), Mission for Integrated Development of Horticulture (MIDH), National Bee Board (NBB) and Khadi and Village Industries Commission and Board (KVIC and KVIB) and many other Ministries and Departments which have developed scientific beekeeping methods and imparted training to beekeepers.
  - However, prices have fallen from more than Rs.300/-per kg to less than Rs. 100/per kg due to international competition (China producing and exporting at least four times more honey than India).
  - The problem of unchecked adulteration in honey with sugar syrups that is difficult to be detected by available standards and laboratories in India is also a cause for falling prices.
  - Due to the presence of cheap adulterated honey in the market, the beekeepers are unable to sell their real honey which is produced with a higher input cost.
  - As honey has to be sold within a short period from the date of production, many of the beekeepers are making distress sale and are at the verge of quitting the profession. This has led to a condition of jeopardy in the honey industry.
4. Followed by the presentation by Dr. Srinivasan, representatives from Horticulture Department, KVIB, and Scientists from different Southern States and Beekeepers from Tamil Nadu made their presentations and expressed their views.
  5. Mrs. G. K. Umarani, Deputy Director of Horticulture, Coimbatore, Tamil Nadu informed that honey bee boxes and bee colonies are being distributed to farmers under MIDH. Shri S. Suresh, Assistant Director, Khadi & Village. Industries, Coimbatore informed that in Tamil Nadu about 25,000 beekeepers with about 2 lakh bee colonies produce about 2000 MT of honey annually by mostly migrating bee colonies to Rubber estates in Kerala, Tamil Nadu and Karnataka, moringa and annual crops in Tamil Nadu. Coconut is a major pollen source. Marthandam Beekeepers Society has been existing since 1937 and has more than one thousand registered members. Honey processing unit located at Amsi in Kanyakumari district is operated by KVIB.
  6. Shri R. Sivaperuman, Deputy Director of Agrl. Horticulture, Puducherry presented the beekeeping scenario in Puducherry. He informed that since 2015-16 bee hives are being provided to the farmers with 40% subsidy under National Horticulture Mission (NHM) schemes. No substantial production and marketing has been made so far in the U.T. of Puducherry. NHM has allocated 850 units for the current year 2018-19. Training will be given to the interested farmers/urbanites. Self Help Groups (SHG) women are being motivated, targeted and proposed to issue 1,000 units of hives for their livelihood under the project "Bee & Me". Assistance will be given to SHG to avail credit linked loan to establish the said project.
  7. Shri Abdul Kareem, K.H. Project officer, Kerala KVIB informed that there are about 5,000



beekeepers in Kerala with about 50,000 bee colonies. He informed that January to April is honey season while May to August is dearth period and September to December is growth period. He further informed that there are six honey processing units operated by Kerala KVIB in different parts of the state. He expressed many problems in beekeeping such as lack of Scientific Training in modern Bee keeping, lack of modern Honey Processing Unit with laboratory facility, lack of knowledge about use of honey, non availability of Quality Hives and Equipments and shortage of Bee Colonies and suggested solutions.

8. Mrs. Sabitha Narayan, Joint Director of Agriculture, State Horticulture Mission, Thiruvananthapuram, Kerala in her presentation stated that Kerala State Horticultural Products Development Corporation (HORTICORP) is the State Designated Agency (SDA) implementing the bee keeping activities in Kerala. Under MIDH, pollination support through beekeeping and under state plan scheme, assistance to honey production is being implemented. During 2017-18, an amount of Rs.1.5 crore has been expended under assistance to honey production scheme which include orientation/follow up/refresher trainings, distribution of bee colonies/bee hives, distribution of sting less bee colonies, establishment of sterile honey collection mechanism, modernization of bee keeping training centre, etc. Mrs. Narayan expressed that with respect to beekeeping in Kerala, statistical database of farmers engaged in bee keeping and quantity of honey production is to be updated, assistance needed to bee farmers during natural calamity, Bee colonies of registered bee keepers have to be insured, transportation assistance may be provided to the bee keepers during migration/transportation of bee colonies, time delay shall be reduced at check posts of police/forest/sales tax during inter-state transportation of bee colonies and marketing problems of honey and value added products have to be addressed.
9. Dr. V.S. Amritha, Assistant Professor of Entomology, KAU, Thiruvananthapuram in her presentation gave an outlook of apiculture practices and research on Indian bee and stingless bee management in Kerala. She gave details on bee forage plants, pollen studies, hiving methods of stingless bees, pests and diseases of bees, pesticide poisoning of bees. She suggested measures such as providing ID cards to beekeepers, vehicles designed for bee colony migration, awareness to people at check post regarding bee migration and its importance, insurance against loss of colonies, awareness on goodness of honey consumption, subsidy for feeding bees with sugar in lean season, ·subsidy for colony migration, registering beekeeper clusters, encouraging formation of cooperative societies of bee keepers and popularizing bee products. ·
- I 0. Shri Keshava Murthy, Senior Assistant Director of Horticulture, Govt of Karnataka, Bangalore stated during his presentation that State Horticulture Department, State Forest Department, Universities of Agriculture and Horticulture Sciences and Khadi and Village Industries Commission / Khadi and Village Board were involved in Apicultural development in Karnataka. He presented the following about beekeeping in Karnataka:
  - Honey Production in Karnataka is around 500-550 MT and the number of beekeepers is about 50,000. The number of bee colonies is approximately 65,000. There are eight co-operative societies and 25 AGMARK registered honey processors and 25 empanelled honey bee box, colony and other related equipment suppliers. Out of 30 districts, fourteen districts have been identified as potential for beekeeping development.

- In Karnataka, Shri Bhagandeshwara Horticulture Farmer Producer Company Limited was registered under Companies Act in March, 2016 with beekeeping as the lead activity and has around 1,060 farmer members. Intensive beekeeping training is given to its interested members and now they are packing and selling honey in their own brand name.
  - During 2018-19, another Farmer Producer Organization with honey as lead activity will be established in Uttara Kannada, which is another potential beekeeping district.
  - Honey is collected from domesticated bee colonies or collected from wild source. Primary and secondary processing are done in private or cooperative processing units. Bottling and branding are done and marketing is done through wholesale or retail markets.
  - The problems encountered in Karnataka included
    - Non availability of superior quality bee colonies.
    - Destruction of flora needed for honey production.
    - Damages due to use of pesticides.
    - Persisting drought conditions in some districts.
  - Karnataka has vast potential for promoting beekeeping activity.
11. Dr. M. Kishan Tej, Scientist, Entomology, ANGRAU, Andhra Pradesh informed that there are about 7,700 beekeepers in Andhra Pradesh traditionally keeping *A. cerana indica* and recently taking up *A. mellifera* also. He informed that there are four potential districts in AP for beekeeping. He also informed the problems faced by AP beekeepers and suggested certain solutions to them.
12. Shri A. Dhandayuthapanai, a leading beekeeper from Erode District in Tamil Nadu requested the support of Government in promoting beekeeping and removing hurdles for beekeepers during migration. Shri N. Thandayuthapani who is a mellifera .beekeeper from Karur District in Tamil Nadu, expressed that bee mites are a problem and requested research intervention. He also requested research on bee forage crops for different honey bees. Shri Henry from Kanyakumari District in Tamil Nadu requested that there should be research based solution for honey bee virus disease. The Government must set up laboratory for testing honey and preventing adulteration. Honey processing, storage and marketing facilities must be created in major honey producing States.
13. Dr. K. Ramaraju, Director of Research, Tamil Nadu Agricultural University, who is an Entomologist by profession, highlighted many of the researchable issues in beekeeping for overall development of honey industry and crop pollination in the nation. Dr. A.S. Krishnamoorthy, Director (CPPS), who is basically a mushroom scientist, proposed business model for production and sale of honey in India.
14. Dr. B.L. Sarswat, ED, NBB gave a detailed account of the status of bee industry in the nation and the need for overhauling the system. He stressed that scientists must work on improving

the nucleus stock of honey bees in India and to take up research on genetics of honey bees and to breed them for disease resistance.

15. During the deliberations, the following solutions were put forth to bring the honey industry and beekeepers in India out of the current crisis:
  - Promoting goodness of honey as food and medicine to ensure health of next generation and create constant demand for honey in Indian market
  - Implementing standards and quality control of honey, preventing adulteration and creating more laboratory facilities for honey testing locally
  - Working out a remunerative price for honey through consensus and maintaining honey price at this level by adjusting supply based on region wise demand and production
  - Creating Integrated Facility Centres in selected districts needed for procurement, processing and sale of honey and bee products
  - Ensuring availability of standard bee boxes and sufficient number of honey bee colonies in potential areas throughout the nation
  - Providing backup through sound scientific research in areas of bee colony multiplication, bee enemy and disease management, increased production of high quality honey and bee products, utilising honey bees for crop pollination and yield increase as agricultural input, selecting and developing bee friendly crop varieties and mitigating pesticide poisoning of bees
  - Providing ample training to develop skills of beekeeping in younger generation
  - Enacting laws & rules for protecting honeybees & beekeeping.
  - National Bee Board, NBB can function as nodal agency / umbrella organization for honey (and hive products) production integrating all departments involved with increased staff, region wise operations, with targets on registering beekeepers. The NBB has to be constituted with industry representatives, scientists, Government officials and people's representatives.
  - ICAR and SAUs to be funded to start centres of excellence in niche areas of honey bee research and to have National Research Centre on honey bees and pollinators.
  - KVIC and KVIB to focus on hive honey and forest honey production, hive products production. Targets can be set for honey and hive product production and sale.
  - APEDA, FSSAI, Skill Council, Forest, Tribal, etc. may deal with matters related to export, standards, skill development, etc. that will be coordinated by NBB.
16. Dr. Bibek Debroy, Chairman, EAC-PM and the Beekeeping Development Committee appreciated the efforts of the Sub-Committee: I in taking the discussions covering different regions in the right direction of achieving beekeeping development. He said NBB can be restructured and rechristened into a much effective organization that will help the beekeepers and honey production in the country. Dr. Debroy reiterated that the



data on honey production is not scientifically collected and needs a systematic approach. Shri K. Rajeswara Rao, Adviser, EAC-PM informed that this task of “examining the issues relating to legal framework, data collection, bee census, etc. and suggesting measures to remove impediments, if any and put in place a systematic/scientific process” has been assigned to the Sub Committee: 2.

17. Shri Ratan P. Watal, Member Secretary, EAC-PM in his concluding remarks said that beekeeping is a very important subject in the nation that the Hon’ble Prime Minister and many of the Chief Ministers of different States in their discussions during a recently held Governing Council Meeting of NITI Aayog stressed the need for developing scientific beekeeping methods in India. Hence, this meeting assumes greater relevance from the stand point of the entire nation. He informed that similar meetings of the Beekeeping Development Sub-Committee: 1 will be held in different parts of the country to get first hand information of the state of the beekeepers and bee industry. Shri Watal and Shri K. Rajeswara Rao, Adviser, EAC-PM advised the Convener of the Sub-Committee: I to start preparation of the draft report based on the discussions held in the meetings conducted so far and that the draft report could be updated based on further discussions to be held in the future meetings covering the States in other regions.
18. Meeting ended with a ‘Vote of Thanks’ to the Chairman and Members of the Sub Committee and all the other participants of the meeting proposed by Dr. N. Muthukrishnan, Professor and Head of the Department of Agricultural Entomology, TNAU.

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**Meeting of the Beekeeping Development Sub-Committee:1 under the Chairmanship of  
Dr. Bibek Debroy, Chairman, EAC-PM held on 5<sup>th</sup> Sep 2018 at TNAU, Coimbatore**

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**List of participants**

- I. Dr. Bibek Debroy, Chairman, EAC-PM
2. Shri Ratan P. Watal, Member Secretary, EAC-PM
3. Shri K. Rajeswara Rao, Adviser, EAC-PM
4. Dr. K. Ramasamy, Vice-Chancellor, Tamil Nadu Agricultural University
5. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore (Convener)
6. Dr. B.L. Sarswat, Executive Director, National Bee Board, MoA&FW, New Delhi
7. Shri V.V. Ramamoorthy, Ex-Professor, IARI, New Delhi
8. Dr. K. Ramaraju, Director of Research, TNAU, Coimbatore
9. Dr. A. S. Krishnamoorthy, Director, (CPPS), TNAU, Coimbatore
10. Dr. M. Chinnadurai, Director, CARDS, TNAU, Coimbatore
11. Mrs. G. K. Umarani, Deputy Director of Horticulture, Coimbatore, Tamil Nadu
12. Mrs. R. Vijaya Kalpana, ADA(QC), Coimbatore, Tamil Nadu
13. Mrs. M. Banumathi, Joint Director Of Agriculture, Coimbatore, Tamil Nadu
14. Shri S. Chanrasekaran, Assistant Khadi Officer, Coimbatore, Tamil Nadu
15. Shri S. Suresh, Assistant Director, Khadi & Village Industries, Coimbatore
16. Shri R. Sivaperuman, Dy, Director of Agrl. Horticulture, Puducherry
17. Shri S. Prabhakaran, Agri Officer, Puducherry
18. Shri Abdul Karim. K.H., Project Officer, KeraJa KVIB
19. Shri James Dominic. B, Beekeeping Fieldrnan, Kerala KVIB
20. Mrs. Sabitba Narayan, Joint Director of Agriculture, State Hort. Mission Kerala, Thiruvananthapuram
21. Mrs. Bindu Muralidran, Technical Officer, State Hort. Mission Kerala, Thiruvananthapuram
22. Dr. Amritha. V.S., Assistant Professor, AICRP on Honey Bees & Pollinators, Department of Agrl. Entomology, Kerala Agricultural University, Thiruvananthapuram
23. Shri Kesavamoorthy, Senior Assistant Director, Department of Horticulture, Ban galore
24. Dr. M. Kishan Tej, Scientist, ANGRAU, Andhra Pradesh
25. Dr. E. Somasundaram, Professor & Head, Organic Farming and PRO, TNAU

26. Dr. P.A. Saravanan, Assistant Professor, Department of Agri. Entomology, TNAU, Coimbatore
27. Shri Dhandayuthapani, ADP Apiary, Sivagiri, Erode, Tamil Nadu
28. Shri Thandyuthapani, Beekeeper, Karur District, Tamil Nadu
29. Shri A. Vivekanandan, Gopi Apiary, Pollachi, Tamil Nadu
30. Shri P. Henry, Kottoor, Cheruvallloor Post, Kanyakumari District, Tamil Nadu

## ANNEX 8

**Government of India  
Economic Advisory Council to the Prime Minister  
NITI Aayog Bhawan, Parliament Street, New Delhi-110 001**

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**Record Note of Discussions held during the meeting of the Beekeeping Development Sub-Committee:2 held under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC PM on 12<sup>th</sup> September 2018 at IBDC, Ram Nagar, Kurukshetra, Haryana**

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1. A Beekeeping Development Committee (BDC) was constituted by the Economic Advisory Council of the Prime Minister (EAC-PM) under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM. BDC in its meeting held on 6<sup>th</sup> June, 2018 decided to set up two Sub-Committees, Sub-Committee: 1 under the convenorship of Dr. M.R. Srinivasan, Professor of Entomology, Tamil Nadu Agricultural University (TNAU), and SubCommittee: 2 under the convenorship of Dr. B.L. Sarswat, Executive Director, National Bee Board (NBB), which was later shifted under the convenorship of Dr. B.N.S. Murthy, Horticulture Commissioner (HC), Department of Agriculture, Cooperation & Farmers Welfare (DAC&FW), with mutual consent. Subsequently, based on the information received from the HC and ED-NBB, DAC&FW, EAC-PM set up the Beekeeping Development Sub-Committee: 2. First meeting of this Sub Committee:2 was held under the Chairmanship of Dr. Bibek Debroy on 12<sup>th</sup> September, 2018 at the Integrated Beekeeping Development Centre (IBDC), Ram nagar, Kurukshetra, Haryana. List of participants is enclosed at Annex-A.
2. Before the Sub-Committee held its deliberations, discussions were held with the progressive beekeepers from the States of Haryana, Punjab, Uttar Pradesh, Rajasthan, Uttarakhand and Delhi, who were invited by IBDC, Ramnagar.
3. While welcoming the participants, Dr. A.S. Saini, DG (Horticulture), Govt. of Haryana presented the status & issues relating to beekeeping in Haryana and the initiatives taken by the Department of Horticulture, Haryana for setting up of IBDCs and other Centres of Excellence (CoEs).
4. Shri Ratan P. Watal, Member Secretary, EAC-PM and Member, BDC in his address stated that the beekeeping is a main occupation for people in India and is one of the priority areas of the Govt. He mentioned that 4-5 Chief Ministers spoke about beekeeping in their respective States during the recently held Governing Council Meeting of NITI Aayog, which was chaired by the Hon'ble Prime Minister. He also mentioned that when he was Secretary (Expenditure), Ministry of Finance, Government of India, reviewed the status of NBB and found that NBB is an organization which has no budget and staff for promoting beekeeping in the country and was being given very meagre amount/funds for implementation of activities under Mission for Integrated Development of Horticulture (MIDH) by the Ministry of Agriculture & Farmers Welfare. In view of this, steps have been taken in this regard and EAC-PM decided

to constitute the BDC so that a report in this regard for overall development of scientific beekeeping in the country may be prepared and submitted to the Hon'ble PM. He requested the beekeepers present in the meeting, to share their experiences and views/suggestions. Accordingly, the beekeepers presented their views, experiences & problems being faced in beekeeping. A list of main issues/views/suggestions made by these beekeepers is enclosed as Annex-B.

5. Thereafter, during the deliberations of the Beekeeping Development Sub Committee:2, Dr. B.L. Sarswat, ED, NBB and Member, Beekeeping Development Sub Committee: 2 made a presentation in respect of the following Terms of Reference of this Sub-Committee:
  - (i) Identifying issues concerning various Ministries/ Departments/ Organisations/ Agencies involved in Beekeeping and suggesting measures to resolve them;
  - (ii) Studying the domestic& International markets/trade for honey & other beehive products and suggesting strategy for promoting production and marketing of quality honey and other beehive products in the country, in a Mission Mode approach; and
  - (iii) Examining the issues relating to legal framework, data collection, Bee census, etc. and suggesting measures to remove impediments, if any and put in place a systematic/ scientific process.
6. In his presentation, Dr. Sarswat explained various aspects of beekeeping in detail such as need for beekeeping/why beekeeping, crop-wise yield enhancement by pollination support through beekeeping in horticultural and agricultural crops, various beehive products, zone/state-wise details of the species, year/state-wise details of honey production for last 7-8 years, country-wise honey production of 10 top honey producing countries, potential/ opportunities in beekeeping in India, which has been estimated about 200 million bee colonies to pollinate 12 major crops, Ministry/Department/Organisation-wise main issues in beekeeping, which need thrust. The following ToR-wise details were presented:

**ToR-1:**The Ministries/Departments/Organisations/Agencies-wise issues & suggestions/ roadmap to address the same were presented in detail. Presentation also included the issues relating to Research (ICAR, SAUs, etc.), strengthening of institutional framework, infrastructure, extension and other related issues. Similarly, the suggestions/roadmap for promotion & development of sustainable & robust beekeeping and to resolve the issues by dividing in 5 different categories including Research & Development, Infrastructural Facilities, HRD, Transfer of Technology, other Promotional Activities and Strengthening of institutional Framework; were presented in detail.

**ToR-2:**The existing system of honey marketing/trade, 8 years details of honey export from India to various countries, suggestions for promoting production & marketing/trade of quality honey & other beehive products in the country on Mission Mode Approach were presented in detail.

**ToR-3:** The legal issues involved in beekeeping, viz.; Forest Act, treating beekeeping\_ as an agricultural activity and beehive products as agricultural produce, designating NBB as National Level Autonomous Agency/Body with sufficient funding and manpower



for overall promotion & development of beekeeping, coordination, execution, implementation, etc. of the activities in the country and also strengthening of research system in beekeeping including CBRTI, etc., were presented.

7. The following issues received from Scouts & Guides for Animals and Birds, raised through grievances, were also placed before the Sub-Committee for consideration, as decided by the Managing Committee of NBB:
  - (i) Introduction of National Commission on Honey Bee, restoring their five freedoms;
  - (ii) Introduction of Honey Bee Act, adopting Honey Bee as National Insect of India;
  - (iii) Protection covers to Honey Bee, under the Wildlife Protection Act, 1972.
8. The projections of number of honeybee colonies, honey production, details of income & employment, etc. by end of the year 2021-22 were also presented. In addition to the above, the details of protection of crops & human life from menace of elephants and monkeys by adopting scientific beekeeping, the initiatives of DAC&FW to promote beekeeping, present status of NBB, initiatives/impact/achievements in beekeeping of NBB since its inception (2006-07), the health benefits of honey/nutritive value, etc. were presented. In the last, it was also suggested for developing isolated bee breeding yards, making forest laws/acts suitable for beekeeping, efforts for conserving wild bees in sustainable manner, research on impact of GM seeds on beekeeping and hiring of honey bee colonies by farmers for pollination support to the crops, etc. were also presented as way forward in beekeeping.
9. Dr. Bibek Debroy, Chairman, EAC-PM mentioned that the data of impact of bee pollination in increasing the yield of various horticultural and agricultural crops, projected/reported by the National Commission on Agriculture (1976) is old. The system of agriculture has changed. Therefore, the latest data in this regard may also be checked. The detailed strategy for developing census/data in beekeeping may be developed by considering in the census of Live Stock or Agriculture/Horticulture. Dr. Debroy suggested that the questions/questionnaire for developing data base/census for beekeeping may be included in the ongoing NSS. He also mentioned that solutions for research related issues, financing beekeeping activities/project by banks/NABARD, etc. and suggestions/solutions for problems relating to beekeeping and presented in the meeting should be worked out along with detailed strategy in this regard. It was further mentioned that NBB should be restructured/strengthened under the Chairmanship of Minister of Agriculture & Farmers Welfare by including representatives of 5-6 major honey producing States so that policy decision in beekeeping may be taken by NBB for further instructions in this regard. Further, Dr. Debroy stressed the need to find out the legal and scientific definition of honey.
10. Shri Ratan P. Watal, Member Secretary, EAC-PM mentioned that a strong & legal framework/system for promotion and development of scientific beekeeping in the country should be developed so that all the issues involved in beekeeping could be addressed. It includes strengthening and giving legal status to NBB and demarcation of duties/work of various organisations involved in research and extension of beekeeping in the country at National and State levels.
11. Dr. A.S. Saini, DG (Horticulture), Govt. of Haryana, stated that bumble bees may also be

promoted for pollination support to the crops. The traceability of the source of products should also be incorporated. Honey may be promoted in Mid-day Meal and other schemes of the Government.

12. Dr. Vikramaditya Pandey, Principal Scientist, ICAR informed that ICAR has 30 centres of All India Coordinated Research Project (Honey Bee & Pollinator) AICRP (HB&P). Spray of pesticides is a problem of beekeeping. Therefore, LPM may be developed and promoted. AICRP (HB&P) may work on development of quality nucleus stock.
13. Dr. A.C. Mishra, Joint Director, FSSAI informed that 172 Testing Laboratories are recognised by FSSAI including 18 referral labs. However, only two labs are fully equipped for honey testing. He mentioned that FSSAI's standards are not applicable at farmers level/raw material. Dr. Bibek Debroy, Chairman, EAC-PM mentioned that labs may be promoted & developed for honey testing. The existing labs may be upgraded. FSSAI may plan/make estimate/forecasting for number of labs to be required/set up as per increase in requirement of honey testing in relation to projections of honey production in next 10 years. In response to issue of problem of availability of Experts/Human Resource in honey testing in India, mentioned by Dr. Sarswat, Shri Ratan P. Watal, Member Secretary, EAC-PM mentioned that HRD programmes for developing experts/labs technicians, etc. for testing of honey may be designed and conducted. FSSAI was advised to provide the details of labs along with complete addresses, etc. to HC and ED, NBB for including the same in the Sub Committee's Report.
14. Shri Hrishikesh, Manager, NDDDB informed that 22 State/Regional Cooperative Dairy Federations with 1.15 lakh dairy milk cooperative societies are associated with NDDDB and marketing/value chain is in existence. Some of the Federations/Societies, viz. Sundervan, Dairy Cooperative Federations/Societies, West Bengal, Dairy Cooperative federation/Society, Muzaffarpur, Bihar and Banas Dairy Union/Cooperative in Gujarat are already involved in beekeeping and marketing of honey. NDDDB is also setting up a World Class State of the Art Honey Testing Lab at Anand with the support of NBB, DAC&FW, Govt. of India.
15. Dr. Ashutosh Upadhyay, Professor & Head, FST, National Institute of Food Technology Entrepreneurship and Management (NIFTEM), Ministry of Food Processing Industries (FPI) informed that there are 172 labs in the country including the one with NIFTEM in which basic tests may be done. Training of experts may be undertaken by NIFTEM. Value added products may also be developed from honey & other products by NIFTEM.
16. Shri S. Sahoo, Director, NAD, CSO, Ministry of Statistics and Programme Implementation informed that from 2007 onwards, census has been dropped. He informed that the questionnaire for collecting data in respect of beekeeping may be developed for NSS.
17. Dr. Yogeshwar Singh, Beekeeping Expert mentioned that he has submitted a roadmap for development of beekeeping to NITI Aayog, which may also be considered. Dr. Debroy, Chairman, EAC-PM advised Dr. Singh to send the same directly to NBB for examination and consideration.



18. Dr. B.N.S. Murthy, HC, DAC&FW mentioned that the beekeeping establishments/ organisations/member societies/firms/companies of NBB & other involved stakeholders for supplying of beehives & beekeeping equipments and honey bee colonies, etc. may be accredited by NBB as happened in case of accreditation of nursery and other items of horticulture by National Horticulture Board (NHB).
19. Shri K. Rajeswara Rao, Advisor, EAC-PM pointed out to the number of beekeepers, etc. provided in the hand-out circulated by IBDC, Ramnagar and enquired about the authenticity and methodology adopted by the Horticulture Department of Haryana in computing such data. Dr. Saini, DO (Hort.), Haryana explained the methodology adopted by them in computing such data and confirmed that the same can be treated as authentic. Dr. Debroy and Shri Watal advised Dr. Murthy and Dr. Sarswat to obtain the details of the methodology adopted by the Horticulture Department, Haryana from Dr. Saini and examine whether the same can be adopted by other States in the country so that the same can be included in the Sub-Committee report as one of the recommendations. Dr. Saini has agreed to provide the details of the methodology adopted by them to Dr. Murthy and Dr. Sarswat.
20. While concluding the discussions, Shri Rajeswara Rao appreciated the efforts of the organizers in conducting the meeting successfully and advised the Convenor of the Sub Committee for preparing the draft report based on the discussions and suggestions conveyed during the meeting. He further added that the solutions to the issues raised by the Beekeepers from the Northern States and those identified/presented during the meeting of the Sub Committee should be incorporated in the draft report. Dr. Debroy and Shri Watal advised that the draft report could be updated as per further discussions and suggestions in the future meetings of this Sub-Committee.
21. Meeting ended with a 'Vote of Thanks' to the Chairman and Members of the Sub Committee and all the other participants of the meeting proposed by Dr. Billu Yadav, Deputy Director, In-charge of IBDC, Ramnagar, Kurukshetra, Haryana.

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**Annex-A**

**Meeting of the Beekeeping Development Sub-Committee:2 held under the  
Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on 12<sup>th</sup> September 2018 at  
IBDC, Ramnagar, Kurukshetra, Haryana**

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**List of Participants**

1. Dr. Bibek Debroy, Chairman, EAC-PM
2. Shri Ratan P. Watal, Member Secretary, EAC-PM
3. Shri K. Rajeswara Rao, Adviser, EAC-PM
4. Dr. B.N.S. Murthy, Horticulture Commissioner, DAC&FW & Convener, BDSC-2
5. Dr. B.L. Sarswat, ED, NBB, DAC&FW
6. Dr. Arjun Singh Saini, DG, Horticulture, Haryana
7. Shri S. Sahoo, Director, NAD, CSO
8. Dr. A.C. Mishra, Joint Director, FSSAI
9. Dr. Vikramditya Pandey, Principal Scientist, JCAR
10. Shri Ashutosh Upadhyay, Professor, FST, NIFTEM, FPI
11. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore
12. Shri Hrishikesh, Manager, NDDB
13. Dr. Yogeshwar Singh, Beekeeping Expert
14. Shri Devvrat Sharma, Beekeeping Expert

**Annex-B**

**Issues raised by the progressive Beekeepers from various Northern States during the meeting held under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on 12<sup>th</sup> September 2018 at IBDC, Ramnagar, Kurukshetra, Haryana**

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1. Beekeeping is now not a beneficial enterprise, due to low prices of honey at beekeepers' level.
2. Poor extension services in the States for beekeeping.
3. Beekeeping equipments, colonies, etc & products should be waived from GST.
4. Hybrid sunflower, eucalyptus clone danger to beekeeping
5. Each district should have beekeeping development staff.
6. Exploitation of beekeepers by middle man
7. Police & officers create problems during migrations
8. Difficulty in getting loans from banks for beekeeping
9. Forest Department do not allow bee colonies in forest area
10. NBB, KVIC, NHM should arrange supply of bee colonies, bee hives & beekeeping equipments through reliable source.
11. NBB registration be done locally
12. Bee Therapy be included as an important component
13. No help for beekeeping from NAREGA
14. Formation of FPOs in Beekeeping should be promoted.
15. Problem of adulteration in honey.
16. Patanjali & Dabur should be asked for the sources from where they are procuring honey. They are not procuring honey from beekeepers.
17. Use of honey in Railways, Defence, etc. should be promoted.
18. More Advertisement to create awareness about granulation of honey
19. Minimum support price for honey should be fixed.
20. The Beekeepers should be trained in latest technologies by NBB. There is no need to develop new beekeepers. Therefore, training to new person may be stopped.
21. Plantation of bee friendly flora in forest & other lands should be promoted.
22. Insurance scheme for beekeeping/bee colonies should be launched.

23. Bee industry is driven by exporters.
24. Beekeeping census be carried out.
25. Production of other bee products/high value products should be promoted.
26. Theft of bee boxes/colonies is the serious problem.
27. Honey should be sold in military shop
28. Subsidy on sugar be provided
29. Social media should be active for beekeeping
30. Subsidy for migration of bee colonies is required.
31. Uniform syllabus for beekeeping training is required.
32. NBB should continue with trainings & other HRD activities so that interested persons may adopt scientific beekeeping.
33. GM seeds should not be promoted. GM crops damage beekeeping.
34. More research in beekeeping is required. New technologies & disease control measures and solutions of problems of beekeeping are not available at research level.
35. Bee mite & other diseases are problems.
36. Bee paralysis is a serious problem for which concrete solutions are required.
37. Full time research workers & extension workers in beekeeping are required.
38. Use of pesticides is a serious problem.
39. Focus on managed bee pollination should be given.
40. Problem of adulteration in honey.
41. New standards of honey should be implemented.
42. FSSAI new standards are different in Hindi & English .
43. More honey testing laboratories should be opened/set up.

## ANNEX 9

**Government of India  
Economic Advisory Council to the Prime Minister  
NITI Aayog Bhawan, Parliament Street, New Delhi- 110 001**

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**Record note of discussions held during third meeting of the Beekeeping Development Sub-Committee: 1 under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM on 4<sup>th</sup> October 2018 at Central Agricultural University, Imphal covering NE States**

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1. Third meeting of the Beekeeping Development Sub-Committee: I covering North Eastern States was held under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM on 4<sup>th</sup> October 2018 at Central Agricultural University (CAU), Imphal. List of participants is enclosed.
2. Dr. M. Premjith Singh, Vice-Chancellor, CAU welcomed Shri Ratan P. Watal, Member Secretary, EAC-PM, Shri K. Rajeswara Rao, Adviser, EAC-PM and other dignitaries/participants to the meeting. Dr. M. Premjith Singh, VC, CAU stated that CAU, Imphal was happy to host the Beekeeping Development Sub-Committee: 1 meeting. He himself being an Entomologist, Dr. Singh stressed the importance of honey bees as essential input for development of agriculture sector. He said that pollinator population is decreasing worldwide and must be conserved. Dr. Singh made a presentation on the honey bee diversity in North Eastern States. He shared a success story of North East India where rice-fallow lands were used for growing rape seed and mustard with honey bee pollination. He presented the research carried out by him on bee flora diversity and melisopalynology (the study of pollen contained in honey and deciphering the geographical location and genus of the plants that the honey bees visited). He called for beekeepers and bee scientists to work tirelessly like honeybees.
3. Shri Ratan P. Watal, Member Secretary, EAC-PM, in his introductory remarks, outlined the reasons for forming the Beekeeping Development Committee by the EAC-PM. He informed that in a meeting chaired by the Prime Minister held a few years ago, the measures for increasing pulse production in India was discussed and honey bees were proposed as an input to increase the pigeon pea production. Chief Ministers of various States have also stressed the need for encouraging honey bees and beekeeping in improving crop yields and farmers income during the recently held NITI Aayog Governing Council meeting, which was chaired by the Hon'ble Prime Minister. He also mentioned that when he was Secretary (Expenditure), Ministry of Finance, Government of India, reviewed the status of NBB and found that NBB is an organization which has no budget and staff for promoting beekeeping in the country and was being given very meagre amount/funds for implementation of activities under Mission for Integrated Development of Horticulture (MIDH) by the Ministry of Agriculture & Farmers Welfare. In this back drop, EAC-PM has constituted the Beekeeping Development Committee (BDC) so that a report in this regard for overall development of scientific beekeeping in the country may be prepared and submitted to the Hon'ble PM.



During its meeting held on 6<sup>th</sup> June 2018, BDC decided to set up two Sub-Committees set up two Sub-Committees under the overall guidance/convenorship of EAC-PM to take up its Terms of Reference (ToR). The Sub-Committees have been conducting meetings in different parts of the country to interact with the progressive beekeepers, scientists, department officials, NGOs operating in that region to know the issues and prospects of beekeeping. Already three such Sub-Committee meetings have been held at New Delhi, Coimbatore and Ramnagar (Kurukshetra, Haryana). Shri Watal further added that North East will be the focus of today's meeting of BDC Sub-Committee: 1.

4. Shri Watal further added that Bees and beekeeping have not been recognised as agricultural activity till now. The BDC will attempt to bring apiculture into mainstream agriculture where pollinators play major role to increase crop yield many fold. This will also fulfil the Union Government's objective of doubling farmers income that will be achieved through increased crop yield by bee aided cross pollination and sale of honey and bee products. There is a vast scope for moving forward in development of beekeeping in India. Scientific interaction is very essential for contextualising the purpose, overall discussion and coordination. Research is also essential in areas of post harvest management of bee products namely royal jelly, bee pollen, beeswax, propolis, bee venom. Conservation of stingless and other native bees is another important area of interest. Interaction with experts and beekeepers throw light on the problem of adulteration of honey with rice syrup or corn syrup and thus, fake honey being sold in local market while good honey being exported. Standardization of honey is prevented by big players in the field despite introducing new stringent standards by the FSSAI. Such issues have to be sorted out. Pineapple is an important crop in North East and bee scientists must work on finding role of bee pollination in this crop which will benefit the farmers of this region.
5. Dr. M.R.Srinivasan, convener of the Sub-Committee: 1 of BDC presented the technical report based on the following Terms of Reference of this Sub-Committee:
  - (i) Suggesting measures for overall development of Scientific Beekeeping in the country and quality production of honey and other beehive products
  - (ii) Coordinating, promoting, sponsoring and supporting research, extension and development programme in Beekeeping in the country as an essential input for agricultural production
  - (iii) Suggesting post-harvest management measures and infrastructural development for beehive products viz. honey, bee pollen, propolis, bee wax, royal jelly, etc.
6. Dr. Srinivasan, during his presentation highlighted the present status of beekeeping in India based on the feedback obtained from stakeholders who attended the earlier meetings in various parts of the country. He informed that the nature of problems expressed by beekeepers and officials in different parts of the country were different from one another. In North India, the beekeepers expressed that the falling price of honey and adulteration to be major problems while in South India, non-availability of sufficient number of boxes and hives for beekeeping and bee diseases were expressed as the major problems. Agricultural scientists have expressed that honeybees and beekeeping must be treated as agricultural input.

- 6.1 Dr Srinivasan also presented the per capita honey consumption in different parts of the world among which India has a very low figure of 20 grams / person / year while, figures of Europe and USA stand at 1500 and 500 grams respectively. Thus the scope for increasing honey consumption in the nation is high which needs creating awareness on the goodness of honey for human health among Indian public.
- 6.2 The route map that can be adopted for improving beekeeping in India was highlighted by Dr. Srinivasan that included making available standard bee boxes, honey bee colonies, imparting training and skill on beekeeping, implementing standards of pure honey, preventing adulteration, promoting honey as food and medicine, ensuring good price for honey, creating post harvest Infrastructure, enacting laws & rules for protecting beekeepers and backing up with sound scientific research.
- 6.3 Dr. Srinivasan also outlined the potential areas of research as diversity of all honey bees and other pollinators, bee breeding and quality improvement, appropriate pollinator for different crops, floral calendars and migratory beekeeping with *Apis mellifera*, conservation and promotion of *Apis cerana*, stingless bees and other native pollinators, bee diseases, enemies and early diagnostic kits, habitat loss, plant protection chemicals and pollinator decline.
7. Dr. B.L. Sarswat, Executive Director, National Bee Board (NBB) informed that NBB is conducting trainings all over India through Integrated Beekeeping Development Centre (IBDC) programmes. He also informed that the wax moth has ability to digest plastic and requested scientists to conduct research on this aspect. He said that the IBDC programmes of NBB are implemented in many parts of the country which has created some visibility of beekeeping and interest among public.
8. Shri A.Dkhar, General Manager of SFAC, Directorate of Horticulture, Meghalaya presented Beekeeping prospects and issues in Meghalaya State as under:
  - The State has three agro- climatic zones, good water sources, beautiful landscapes and is endowed with a variety of rich indigenous flora that bloom in different seasons of the year, plantation and orange groves in the Ri-War, Ri- Bhoi areas and Garo Hills. The organic cultivation and traditional way of beekeeping is practiced in the rural and interior areas.
  - Apiculture plays a vital role in the livelihood promotion of the farmers in Meghalaya. In order to intensify the production of honey in the state, the Government of Meghalaya, launched the State Apiculture Mission under the Integrated Basin Development and Livelihood Promotion Program (IBDLP) in 2014.
  - One of the mission support components of MIDH is “Pollination Support through Bee Keeping” as one of the mission intervention. The responsibility for co-ordinating the bee keeping development program in the State is vested with the State Designated agencies namely Meghalaya SFAC, Directorate of Horticulture and MKVIB. About 2750 bee hives and colonies and 330 equipment set have been distributed to beekeepers during 2015-16 and 2017-18.
  - Here in Meghalaya in the month of November and December there is one minor

harvesting season which they call as the growth period. The main harvesting usually starts from the last week of February to April and if the monsoon is late then it might extend up to the month of May

9. Dr. N.S Azad Thakur, Professor, Entomology, College of Post Graduate Studies, Umiam, CAU, Imphal presented the following on Meghalaya State beekeeping.

- Bee keeping is part of Meghalaya's tradition, at first it was done for self-consumption but later it changed to be their means of livelihood. Bee keepers in Meghalaya are poor and landless farmers of the state who are unorganized in marketing their products but have got their own traditional skills and knowledge in keeping bees. Most of the beekeepers are illiterate and primitive type of beekeeping still in vogue.
- Poor management of honey bee colonies and difficulties in the migration of honey bee colonies due to difficult terrain/topography, susceptibility of honey bees to different diseases, pesticide hazards and marketing of bee products are the major limiting factors in beekeeping. No proper pricing. The range of the honey is from Rs. 120- 220 per litre. The consumers purchase this honey at higher prices from the market due to middle men.
- There is a wide scope of bee keeping in Meghalaya, traditionally the beekeepers have their own knowledge and skills in beekeeping. By utilizing these skills together with the modern knowledge and assistance mainly in the marketing processes like processing, labelling and value addition will widen the scope of bee keeping in Meghalaya. Beekeeping may be complementary or substitute of reduction of poverty in the state and country. Different species of stingless bees are present in the state which can be further explored and hived for bee keeping, offers good scope for pollination and hybrid seed production under green house/ poly-house conditions, besides yielding high priced honey, which will be source of extra income of the beekeepers. Agriculture in Meghalaya is by default an organic agriculture hence there is a scope for organic beekeeping.

10. One of the Beekeepers from Meghalaya suggested that bee village concept can be introduced to promote beekeeping. Standardization and getting geographical indication tag (GI tag) to Meghalaya honey or north east honey can improve sale of honey worldwide. Honey laboratory of international standard has to be setup. Honey forage plants must be planted in national highways. He said he started with one bee colony and could multiply it to 40 bee colonies. He gets 6 kg / hive / year in *A.cerana*. He also requested government support to get honey bee boxes. Training on scientific beekeeping required and loans be arranged to buy bee boxes were the requests of the farmer.

11. Shri D. Majaw, President, Ri Bhoi District Farmers Union, Umsning of Meghalaya State suggested the following improvements in beekeeping in their region:

Creation of honey bee network under colleges and to adopt bee villages by colleges under CAU, Imphal, standardization of honey (product) i.e Geographical Indicator, chemical composition, and with brand name, improving international trade through Act East Policy, especially in South East Asian countries, establishment of village level honey processing

unit along with bee based project for entrepreneurship development and empowerment, introducing advanced Australian flow beehive technology and creating outlet of honey based value added product at Lad Umsaw point at Umiam, Ribhoi District on National Highway.

12. Shri N. Nando Singh, Associate Professor, G.P. Women's College, Imphal has presented the status of beekeeping in Manipur as follows:
  - Most of the beekeepers do not have full knowledge of modern beekeeping and do it as a part time job. This results in low honey production sufficient for local consumption. At present only *Apis cerana* is being kept and *Apis mellifera* beekeeping is in introductory testing stage.
  - Lack of scientific knowledge of modern beekeeping, beekeeping equipments not readily available, lack of improved hives, lack of bee colony to supply for the beginners, long rainy seasons weaken the colonies that need efficient management.
  - Research needed and awareness to be created on yield increase in crops by beekeeping through pollination, pest and disease management. Financial support needed for beekeepers. Consumer awareness to be created about honey and bee products.
  - Beekeeping industry has great self-help potential for the rural people, tribals, marginal and small farmers, land-less labour, etc. We have inherited and adapted traditional beekeeping knowledge. We produce good quality honey. Bee keeping will improve the rural economy of Manipur. Hence encourage beekeeping to save the mother earth from changing environment.
13. Shri S. Maung Singh, Vice-Chairman of Manipur Beekeeper Federation informed that marketing of honey is a problem. He requested for stainless steel containers for storing honey. He said that bee boxes for rearing honey bees are of short supply. Planting of bee flora is essential. Bee hive manufacturing unit, mass queen rearing unit for multiplying bee colonies have to be supported by government. Installing summer water pump for hill side is required for maintaining flora and bee colonies in summer. Floral calendar must be prepared for the region. Research on organic honey production and utilizing beekeeping as component of integrated farming system are essential. He lamented that the habit of honey hunting of rock bee has decreased the number of rock bee colonies.
14. One of the Beekeepers from Manipur informed that he has 600 bee colonies. He said that he harvested two tonnes of honey in a year. There are two seasons in May and Oct-Nov for honey harvesting. He requested research focus on wax moth problem in bee hives and bee sting allergy. He also requested floral calendar for the region. *A. Cerana* is well adapted while *A. Mellifera* has failed after its introduction in the State. He requested for on-farm training to beekeepers on the scientific techniques. He said that he requested financial support from NBB through NHM but could not succeed. He complained about the selection process of beneficiaries under NHM for providing bee boxes. He requested for financial assistance to right beekeepers from the government.
15. Another Beekeeper from Manipur requested support from Government for motivating farmers to take up scientific beekeeping. He requested convergence of Government machinery in achieving success in beekeeping. Social forestry can be encouraged to help



beekeeping through planting bee forage plants.

16. Shri Rodinsanga Renthlei, Assistant Project Engineer, MKVIB has presented the following status of beekeeping in Mizoram:

- Bee Keeping has a tremendous scope for development in Mizoram. The untapped potential of beekeeping yet remain to be explored for increasing opportunities for gainful employment and income in Mizoram. Mizoram is hilly State and has abundant flora and the average temperature in between 20 – 30°C throughout the year which is good for bee keeping.
- *Apis cerana indica* is most suitable species of honey bee that is indigenously reared. *Apis dorsata* (Rock bee) is found throughout the rocky cliffs. *Apis mellifera*, the European bee has not met with success after its introduction in 1900.
- Beekeeping unlike several other Industries was a traditional enterprise in Mizoram, even though it has chequered and fascinating history. Collection of Honey from wild bee colonies by smoking away the bee and squeezing out their combs for honey was traditional practice since time immemorial in Mizoram.
- Beekeeping has been recently recognized as important factor that contribute for the development of the region. Mizoram KVI Board took up the task of Beekeeping development in the State. The Board was financed as State Designated Agency (SDA) under Ministry of Agriculture Department and Co-operation since 1999-2000 up to 2004-2005.
- Honey production in Mizoram has increased from 12 to 15 tonnes per annum in 1986-90 to 36 to 45 tonnes annually in 2011-2017 and the annual revenue from honey sale has increased from Rs. 220 lakhs to 1700 lakhs in this period. There are 91 beekeeping associations registered with Mizoram KVI Board with 1167 members rearing about 5900 bee colonies.

17. Prof. H.K. Singh, Department of Entomology, Nagaland University gave details of Nagaland State beekeeping as under:

- Nagaland is an important biodiversity hotspot having vast bee flora and fauna diversity. Agriculture is the main commercial activity and beekeeping is an important integral part of the people in the state.
- Among different honey bees, stingless bees and Indian honey bee are most dominant and farmer friendly bees found throughout the Nagaland. Four species of stingless bees have been identified from different districts of the state.
- Domestication of 3 different species of stingless bees are undertaken scientifically for managed pollination and scientific honey extraction.
- Presently, in Nagaland beekeeping is practiced in traditional manner (in simple, tree trunks, logs, bamboos & underground domiciles) with low honey production (110 MT in 2007) and more bee colony losses.



- Mostly beekeeping is done for honey/bees wax and people are less aware about the valuable service rendered by the bees i.e. pollination.
  - The research work done on bee flora, nest architecture of stingless bees, pollination potential of bees under open and protected cultivation of vegetables was presented.
18. Shri Intiwapang Mer, Team leader, Nagaland Beekeeping and Honey Mission made a presentation giving the following details:
- Rich plant biodiversity, vast bee foraging areas, rich traditional knowledge and practices, availability of skilled carpenter and timber, Ideal climate with short dearth period and negligible use of pesticides are the bright aspects of Nagaland for beekeeping
  - There are about 75,000 *A.cerana* (Indian bee) colonies of which 30,000 are in traditional hives and 45,000 are in scientific hives. The number of wild colonies of *A.dorsata* / *A laboriosa* (Rock bees / Himalayan rock bees) is about 5,500. *A. florea* (little bees) is not found while stingless bee colony population is about 14,000. The total honey production annually is about 430 MT. Per capita honey consumption is about 134 g which quite high compared to national average of 20g.
  - NBHM launched by the Government of Nagaland in Oct, 2007 as a mission mode programme to create a road map for the promotion of development of beekeeping and honey in the State. First State in the country to have launched a mission on beekeeping and honey enterprise. NBHM designated as the SDNA (State Designated Nodal Agency) for implementing beekeeping programmes in the State.
  - Capacity building, publicity, extension & studies, technology advancement & dev. and post-harvest management are done by NBHM. The NBHM has a plan to increase the no. of beekeepers and bee colonies through systematic training so that honey production will be increased to about 2000MT by the year 2030.
  - Lack of studies and research, paucity of funds, adhering to older methods of beekeeping, loss of habitat diversity of honey bees, lack of market linkages, mobility and transportation are the major constraints expressed by the NBHM.
  - Up-scaling of Trainings and Development covering all the villages in the state, establishing '*Integrated Beekeeping Development Centre*' in all the potential districts in the state, developing *bee tourism* as a viable industry, encouraging and promoting planting of bee-foraging plants, turning the mission mode programme to a *revenue earning* and self sustaining entity, convergence with agri and allied departments for addressing issues of food security, bio-diversity conservation and sustainability of the sector are the measures suggested for future.
  - With the availability of fund from the funding partners, the Mission will focus on achieving the vision of Hon'ble PM for doubling of income by 2022 by facilitating 1 lakh registered farmers with 5 Bee boxes and equipments each.
19. One of the Beekeepers from Nagaland said that he got attracted to the stingless beekeeping (Meliponiculture) with the support of NBHM. He currently has about 150 stingless bee

colonies producing 50 to 60 kg honey / year that fetches about Rs.1,500 per kg. The farmer has designed innovative hive for stingless bees that produce up to 1 kg / hive / year. He said that he needs financial support from Government for raw material procurement for his hives.

20. Dr. V.V. Ramamurthy, Ex-Professor, IARI and Member of BDC Sub-Committee: 1 informed that lot of good interaction on scientific beekeeping has taken place in the meeting. The beekeepers that practice traditional beekeeping must be educated on the advantages of scientific beekeeping and motivated to take it up. He stated that monitoring and review of the existing Government run programmes are essential to find out gaps in the needs of people. Dr. Ramamurthy also suggested that farmer producer organizations can be formed in beekeeping also which can promote beekeeping. Being the Chief Editor of the Indian Journal of Entomology published by Entomological Society of India, he offered that scientific articles on beekeeping can be published in that journal and that manuscripts are welcome.
21. In his concluding remarks, Shri K. Rajeswara Rao, Adviser, EAC-PM expressed satisfaction on the interactions made during the meeting and appreciated active participation and interest shown by Beekeepers, State Government representations, Scientists, Federations, NGOs, etc. from the North Eastern States in the discussions aimed at development of beekeeping in the country as a whole. He said the scenario in the North Eastern States is totally different from other regions of the country. He further added that the discussions in the meeting are in line with the ToR and focussed. In this regard, he also appreciated the organizers of the meeting including the Vice-Chancellor, Registrar and other officials of the Central Agricultural University, Imphal.
22. While formally concluding the discussions, Shri Ratan P. Watal, Member Secretary, EAC-PM said that apiculture has lot of potential in improving livelihood of people of North East. He requested that best practices must be followed by beekeepers and recommended by scientists and officials. Training on proper scientific beekeeping is a must. The man-animal conflict can be sorted out by having beehives in wild elephant prone areas. As suggested by one of the Beekeepers, Geographical Indication (GI) must be obtained for honey produced in North East. As emerged during the discussions, in Nagaland, stingless bees must be encouraged and separate standards must be made for stingless bee honey that is entirely different from hive honey in characteristics but fetches lot of revenue for its medicinal properties. Shri Watal observed that care should be taken so that such standards do not become impediment for production and sale of stingless honey. Bee parks must be established in appropriate locations to encourage beekeeping and create awareness among public. Floral calendars must be made wherever essential by scientists. The middlemen or aggregators must not be allowed to exploit the beekeepers. Now that the National Horticultural Mission and the National Bee Board have been made as Central Sector Schemes, funding can be obtained from them. System of accountability through periodical monitoring and review must be in place for such schemes.
23. Meeting ended with a 'Vote of Thanks' to the Chairman and Members of the Sub-Committee and the participants from various parts of North Eastern Region, proposed by Dr. K. Mamocha Singh, Registrar, CAU, Imphal, who played a crucial role in organizing the meeting.

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**Meeting of the Beekeeping Development Sub-Committee:1  
under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM  
held on 4<sup>th</sup> Oct 2018 at CAU, Imphal for NE Region**

**List of participants**

1. Shri Ratan P. Watal, Member Secretary, EAC-PM
2. Shri K. Rajeswara Rao, Adviser, EAC-PM
3. Dr. B.L. Sarswat, Executive Director, National Bee Board, MoA&FW, New Delhi
4. Prof. M. Premjit Singh, Vice-Chancellor, CAU, Imphal
5. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore (Convener)
6. Dr. V.V. Ramamurthy, Ex- Professor, IARI, New Delhi
7. Dr. K. Mamocha Singh, Registrar, CAU, Imphal
8. Shri C.A. Srinivasamurthy, Director of Research, CAU, Imphal
9. Shri S. Baranta Singh, Director of Instructions, CAU, Imphal
10. Shri S. Jogendrakumar, CAU Imphal, Manipur
11. Shri A. Debanath singh, Treasurer, Manipur Beekeeping Federation (MBKF), Manipur
12. Shri L. Nimaoar Singh, Member, MBKF, Manipur
13. Shri N. Nando Singh, Associate Professor, G.P. Women's College, Imphal , Manipur
14. Shri Thibomcha Singh, Asst. Officer, MBKF, Manipur
15. Shri S. Mangi Singh, Vice-chairman, MBKF, Manipur
16. Shri H. Subhachandra Seng, Member, MBKF, Manipur
17. Shri P. Sharat, Executive, Member, MBKF, Manipur
18. Shri P. Narendra singh, Retd. BDO and proprietor, Radha Apiary, Manipur
19. Shri Wonme, Chairman , BKDA , Manipur
20. Shri P. Rommei, Beekeeper, Matai, Manipur
21. Shri P. Anand, Beekeeper, Matai, Manipur
22. Shri S. Robin, Bee keeper, Manipur
23. Shri S. Thuireila, Beekeeper, Manipur
24. Shri S. Worthemphy, Beekeeper, Manipur
25. Shri N. Premanada Singh, Mission Director, MIDH (H&SC), Manipur

26. Shri Chungong Pamei AAO,MIDH ( H&SC), Manipur
27. Shri K. Debadutta Sharma, Project Director, MOMA, Manipur
28. Shri Y. Ibochou Singh, Beekeeper , Manipur
29. Shri L. Sakhandro Singh, Beekeeper Manipur
30. Ms M. Jina Devi, Member, MBKF, Manipur
31. Ms M. Marry Devi, Member, MBKF, Manipur
32. Ms M. Ranjana Devi, Member, MBKF, Manipur
33. Shri Daya Ram, GAU, Manipur
34. Shri Rodinsanga Renthlei, Asst. Project Engineer, KVIC, Mizoram
35. Dr. N.S.A.Thakur, Professor CAU, CPGS, Umaiam, Meghalaya
36. Shri D. Majaw, President, Ri Bhoi District Farmers Union, Umaiam, Meghalaya
37. Shri A. Dkhar, General Manager, SFAC, Directorate of Hort, Meghalaya
38. Dr H.K. Singh, Professor of Entomology, Nagaland University, Nagaland
39. Shri Intiwapang Aier, Team leader, Nagaland Beekeeping and Honey Mission, Nagaland
40. Shri Nzawbemo. K. Lotha, Team member NBHM, Nagaland
41. Shri Takambe, Beekeeper, Nagaland
42. Shri Ningsungwati, Beekeeper, Nagaland
43. Shri Senka Samir, Deputy Director (Horticulture), Nagaland



## ANNEX 10

**Government of India**  
**Economic Advisory Council to the Prime Minister**  
**NITI Aayog Bhawan, Parliament Street, New Delhi - 110 001**

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**Record note of discussions held during fourth meeting of the Beekeeping Development Sub-Committee: 1 under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM on 16<sup>th</sup> October 2018 at CBRTI, Pune**

1. Fourth meeting of the Beekeeping Development Sub-Committee: I covering the Western Region was held under the Chairmanship of Shri Ratan P. Watal, Member Secretary, Economic Advisory Council to the Prime Minister (EAC-PM) on 16<sup>th</sup> October 2018 at Central Bee Research and Training Institute (CBRTI), Pune. List of participants is enclosed.
2. Shri Ratan P. Watal, Member Secretary, EAC-PM in his opening remarks explained about constitution of the Beekeeping Development Board by the EAC-PM and requested the participants to provide suggestions for development of beekeeping in the country with specific reference to the Western Region. Shri Y.K. Baramatkar, Deputy Chief Executive Officer (Village Industries/ Honey Mission) welcomed Shri Ratan P. Watal, Member Secretary and Shri K. Rajeswara Rao, Adviser, EAC-PM and other participants to the meeting. Shri Y.K. Baramatkar made a presentation about the beekeeping potential and the role of KVIC in improving beekeeping in the nation. Dr. M.R. Srinivasan, Convener of the Sub-committee:1 of the Beekeeping Development Committee presented the technical report based on the terms of reference of the Sub-committee:1.
3. Shri Vishal Choradiya, Chairman, KVIB, Maharashtra; Dr. K. K. Kshirsagar, Ex. Senior Scientific Officer, CBRTI, Pune; Dr. Milind Wakode, Ex-Deputy CEO (Beekeeping), KVIC; Dr. Daisy Thomas, Ex Dy Director, CBRTI, Pune; Dr. Gopal Paliwal, Center for Beekeeping Development, Wardha, Maharashtra; Dr. T.B. Nikam, Retd. Assistant Professor, Arts and Science College, Nashik; Dr. R.P. Phadke, Retd. Director, CBRTI, Pune; Shri Devvrat Sharma, Beekeeping Expert; Dr. D. M. Wakhle, Ex. Development Officer, CBRTI, Pune; Shri Vivek Khalokar, Beekeeper, Amaravati Honey; Dr. Lalit Ghetiya, Associate Professor, Navsari Agricultural University, Gujarat; Dr. B.L. Sarswat, Executive Director, National Bee Board and Dr. B.N.S. Murthy, Commissioner of Horticulture, DAC, MoA&FW, Govt of India provided suggestions for overcoming constraints with specific reference to Western Region and for overall development of beekeeping in the country.
4. The following suggestions for overcoming constraints with specific reference to Western Region and for overall development of beekeeping in the country emerged during the deliberations:
  - Due to deforestation, rock bee colonies are moving towards urban areas. There are more than 5000 operators in Pune city who destroy rock bee colonies. Hence rock bee colonies are dwindling in number. Immediate research focus is needed on this and rock bees have to be protected.



- Census of beekeepers, bee colonies, etc. should be done. Since honey bee colonies are becoming endangered, colony census and bee health status are to be taken up. National benchmark has to be developed on bee colony numbers. Real-time moving map has to be generated based on remote sensing techniques. Merely estimating the number of bee colonies is not correct. It is better to assess the health and strength of the individual bee colonies to assess their potential in pollination and production of hive products. Honey bee can be made as the national insect of India
- On Gandhi Jayanthi day 2nd Oct, 2018, the Chief Minister of Maharashtra launched an App called “Friends of Honey Bees” for connecting farmers and beekeepers for migration. Such initiatives must be made nationwide.
- CBRTI has to be strengthened and revived to its original performance level as it is not in the same condition as it was a few decades ago. Training courses have been standardised and available but trained technical staffs are wanting. There can be recruitment of contractual research fellows as in Universities to fulfil this task, if not permanent staff recruitment.
- Indian bee journal or similar magazine must be brought about for publishing beekeeping related research articles.
- Research on bee disease diagnosis must be strengthened in the nation. Establishing state wise honey bee polyclinics for bee disease diagnosis. Functional strategies for minimizing stress from extrinsic factors on honey bees for better health of bees and brood. Thai sacbrood virus is a problem and does not have solution for last 20 to 30 years. Research has to be done on this.
- Scientific beekeeping with BIS hives is essential. The bee boxes are not as per standards, since many bee-boxes in the market are having TOP which is “HUT SHAPE”, which normally should be PLAIN. Modifications in bee box suitable to extreme climatic conditions. Instead of two chambers of equal height, shallow super should be used. Bee-hives, Comb Foundation Sheets etc. should be readily made available to beekeepers on subsidized rates. Low cost ‘Janata’ bee hives or Top Bar hives may be made available to new beekeepers.
- Honey is extracted by the many beekeeper’s is taking honey from brood chamber, rather than the super chamber. This is greatly affecting the quality and management of honey and health of bees. Unripe honey must not be harvested.
- Health of bee queen has to be maintained by bee breeding and policy must be made on this just as in Slovenia which has maximum density of beekeeper population. Queen rearing and selective multiplication of superior colonies of *Apis mellifera* and *A. cerana*, improvement of stingless bee boxes and introduction of stingless bee technology to other locations in India are of prime importance. Queen rearing has to be done to provide matching supply of bee colonies to high demand at present. Adoption of artificial insemination technology or similar biotechnologies for improving present stock to increase biological efficiency of queen, worker and male bees.
- Even though the general opinion and scientific understanding is that rice and wheat do not need cross pollination, it has been found that the rabi rice in Maharashtra requires cross pollination by honey bees.
- Mixed crop is very important for biodiversity in crop ecosystem that can lead to

conservation of pollinators.

- Convergence of ministries and capacity building of stakeholders are essential. Symbiotic and inter-ministerial and inter-departmental healthy relationship.
- Standards of honey particularly HMF and antibiotic content must be monitored. New laboratories must be established to test honey with new standards. Recording source of honey, tracing hive records and recording the volatiles honey are methods to prevent adulteration
- Beekeeper must be protected by law. Insurance coverage must be given to bees and beekeeper. For implementation of government schemes, land documents are insisted which is not possessed by beekeepers who are landless. Banks refuse to provide farm-loans to beekeepers as they are landless. These have to be rectified and beekeepers must get help. Migration of honey bees must be supported in form of migration vehicles and preventing harassment during migration. Beekeepers need to be protected during migration from exploitation.
- Identification of native bee plants and efforts for enriching and conserving wild flora by establishing bee plant nurseries.
- Preparing a state/region wise floral calendar and the period of honey flow seasons in a region.
- Call centres or beekeepers helpline to provide information on beekeeping. Preparing a directory of professional bee keepers, equipment suppliers, recognized practical training centres, bee scientist and subject experts, bee and plant nurseries, bee polyclinics, state wise research institutes providing guidance on scientific bee keeping
- Creating immediate availability of bee pasturage by broadcasting of seeds in forest, available waste land or farm land. In addition, long term planning for plantation of bee plants is also important.
- Popularizing bee and brood friendly organic farm practices (organic farming) to stop bee poisoning from poisonous pesticides and creating awareness on agroforestry concept to increase bee pasturage.
- Introduction of vocational/career/skill-oriented courses in apiculture in school, college and universities. Bee literary program on induced pollination and pollination benefit and on commercial honey production. Syllabus of Agri. Schools may be revised to include practical aspects of beekeeping. All Agri. School should have a small apiary of 10 bee colonies. Syllabus of Agri. Colleges, Forest Colleges etc. may be revised to create technicians, research workers and scientists.
- Apitherapy, the science of using bee sting in medicine must be legitimised as in Korea, Thailand and Ukraine. Certificate and diploma courses in apitherapy should be introduced in education stream and its affiliation to state health universities. Establishing apitherapy centers in collaboration with district civil hospitals for curing diseases and for better health of people.
- Utilizing all the bee colonies for planned pollination of crops should be the theme of development of beekeeping industry in India.
- A comprehensive plan for the development of beekeeping industry in India should be

prepared with short term projects (1 to 2 years), mid-term projects (3 to 5 years) and long-term projects (5 to 10 years) .

- A Plan “Vision 2030 for the development of Beekeeping Industry in India” with a target of establishing 50 lakh bee colonies must be prepared
  - Technical skills of beekeepers should be upgraded. Krishi Vigyan Kendras should have beekeeping Demonstration-cum-Training Units.
  - Diversification of bee products should be done to make the beekeeping industry self reliant.
  - Stingless bees will be useful for stationary beekeeping while *Apis cerana* and *A. mellifera* can be migrated.
  - Increasing awareness on health benefits of honey must be made. Special drive on honey consumption must be taken up. Value added and health products must be made from honey and other bee products. Honey must be included in mid day meals after convincing NIN and getting its advice. Celebrating pollinator week can increase awareness on usefulness of honeybees and pollinators.
  - *Apis florea*, the little bee may be used in pollination by migration.
  - Certificate of origin of bee products must be made mandatory to prevent adulteration. Organic honey must be accompanied by certificate. Unifloral honey must be tested based on volatile compounds present (organoleptic properties) in honey rather than on pollen content. Tulsi and jamun honey have better properties than Manuka honey but is less exploited. Processing of honey is needed but moisture reduction step is not essential. Jamun honey is sterile in nature like Manuka honey and thus can be popularized like Manuka honey.
  - Achieving target by distributing bee colonies to people who are not sufficiently trained will not serve the purpose. It will be detrimental to beekeeping and will be a wasteful exercise and waste of money.
5. In his concluding remarks, Shri K. Rajeswara Rao, Adviser, EAC-PM conveyed thanks to all the participants for their active participation in the discussions and providing suggestions based on their experience and expertise in beekeeping.
  6. Meeting ended with a “Vote of Thanks” to Shri Ratan P. Watal, Member Secretary, EAC-PM and other participants of the meeting proposed by Shri Deep Varma, Director, CBRTI, Pune.

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**Fourth Meeting of the Beekeeping Development Sub-committee: 1 under the Chairmanship of Shri. Ratan P. Watal, Member Secretary, EAC-PM held on 16<sup>th</sup> October 2018 at Central Bee Research and Training Institute, Pune**

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**List of Participants**

1. Shri Ratan P. Watal, Member Secretary, EAC-PM - In Chair
2. Shri. K. Rajeswara Rao, Adviser, EAC-PM
3. Dr. B.N.S. Murthy, Horticulture Commissioner, MoA&FW, New Delhi
4. Dr. B.L. Sarswat, Executive Director, National Bee Board, MoA&FW, New Delhi
5. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore (Convener)
6. Shri. Y. K. Baramatkar, Dy CEO, KVIC-Mumbai, Incharge Honey Mission
7. Shri. Vishal Chordiya, Chairman, KVIB, Maharashtra, Dy CEO, KVIB Mumbai
8. Shri Devvrat Sharma, Beekeeping Expert
9. Shri Deep Verma, Director, CBRTI, Pune
10. Dr. Gopal Paliwal, Center for Beekeeping Development, Wardha, Maharashtra
11. Dr. K. Lakshmi Rao, Asst. Director, CBRTI, Pune
12. Dr. K. K. Kshirsagar, Ex. Senior Scientific Officer, CBRTI, Pune
13. Dr. D. M. Wakhle, Ex. Development Officer, CBRTI, Pune
14. Dr. T.B. Nikam, Retd. Assistant Professor, Arts and Science College, Nashik
15. Dr. Daisy Thomas, Ex Dy Director, CBRTI, Pune
16. Dr. M.T. Wakode, Ex. Dy CEO, KVIC, Pune
17. Mr. Vivek Khalokar, Beekeeper, Amaravati Honey
18. Dr G.K. Mahapatro, Head, IARI Regional Station, Pune
19. Dr. Lalit Ghetiya, Associate Professor, Navsari Agricultural University, Gujarat
20. Mr. Sudhir Patil, Honey Trader, Satmaha Naturorich Products
21. Dr. Jawale Chetan S, Asst. Prof., Zoology
22. Dr. Tushar H.Borse, Asst. Prof. Biochemistry
23. Mr. Bipin Jagrup, Deputy CEO, MSKVIB
24. Mr. Mukund S Patel, Beekeeper
25. Mr. Manasaheb ingale, Beekeeper
26. Mr. Tilak teewaynee, KPMG, KVIC mumbai
27. Mr. Prasana, PA to chairman MSKV
28. Mr. Subba Rao, Retired Scientist, CBRTI, Pune
29. Mr. Amit godse, Beekeeper
30. Mrs. Lalita C. Jawab, President of honey bee care cluster
31. Mr. Sachin G.Ugale, Beekeeper
32. Mr. Vishnu Govinda Jangale, Beekeeper



## ANNEX 11

**Government of India  
Economic Advisory Council to the Prime Minister  
NITI Aayog Bhawan, Parliament Street, New Delhi - 110 001**

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**Record note of discussions held during fifth meeting of the Beekeeping Development Sub-Committee: 1 under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM on 15<sup>th</sup> November 2018 at Sher-e-Kashmir University of Agriculture and Technology for Kashmir (SKUAST- K), Srinagar**

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1. Fifth meeting of the Beekeeping Development Sub-Committee: 1 covering Jammu & Kashmir was held under the Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM on 15<sup>th</sup> November 2018 at Sher-e-Kashmir University of Agriculture and Technology for Kashmir (SKUAST- K), Srinagar, Kashmir. List of participants is enclosed.
2. Prof. Dr. M.Y. Zargar, Director Research, SKUAST-Kashmir, Srinagar welcomed Shri Ratan P. Watal, Member Secretary, EAC-PM; Shri K. Rajeswara Rao, Adviser, EAC-PM; Prof. Dr. Nazeer Ahamed, Vice-Chancellor, SKUAST-Kashmir and other dignitaries for the meeting.
3. In his opening remarks, Shri K. Rajeswara Rao, Adviser, EAC-PM explained the participants about the constitution of the Beekeeping Development Committee (BDC) by the EAC-PM. He informed that in order to get first hand information on the issues being faced by the beekeepers in different regions and the suggestions to mitigate such issues, region-wise meetings are being held. He further added that recognising the fact that J&K has to be considered as a special region in view of its geo-physical conditions, this meeting was convened so as to understand the issues in beekeeping development in J&K region. Shri Rajeswara Rao conveyed thanks to Dr. Nazeer Ahamed and his team for making arrangements for the meeting.
4. Dr. M.R. Srinivasan, Convener of the Sub-Committee: 1 of the Beekeeping Development Committee presented the technical report based on the Terms of Reference. Dr. B.L. Sarswat, Executive Director, NBB; Dr. Manzoor Parray, Professor and In-charge of RTCPPPM, SKUAST-K; Shri Devvrat Sharma, Beekeeping Expert from UP State; Shri Jaidev Singh of Ambrosia Honey Pvt Ltd; Shri Rashid Ahmad Qadri, Secretary KVIB, Government of J & K; Shri Ahamad Wani, Beekeeper; Shri Noor Ahamed of Valley Apiaries; Shri Mohammed Rafiq, Agriculture Development Officer, Baramulla; Dr. Shoucath, Professor of Agronomy, SKUAST-K; Shri A. Dhandayuthapani, Beekeeper from Tamil Nadu and Prof. Dr. Nazeer Ahamed, Vice-Chancellor of SKUAST-K spoke about their experience and provided suggestions for improving beekeeping in J&K region.
5. The following emerged during the discussions:
  - 5.1 The present status and potential of beekeeping in J&K region**
    - Beekeeping has tremendous scope in J&K. The reasons for the potential for beekeeping



are availability of raw material, skilled labour and consumer demand.

- Kashmir is full of floral gaieties with numerous varieties of cultivated and wild plants that bloom from early spring till late fall providing nectar & pollen to the honey bees. This helps in producing honey & other beehive products thus providing gainful employment to the thousands of rural families and extra income to unemployed youth.
- There are about 73 thousand bee colonies in the state with Jammu having about 45 thousand and Kashmir having 28 thousand bee colonies.
- The total honey production in the state is about 71 metric tonnes (However the Ministry of Agriculture and FW pegs the annual production at 1100 tonnes during 2016-17 and 2017-18). There are about 1722 beekeepers in Kashmir. The species of honey bees in J&K include *Apis cerana indica*, *Apis mellifera*, *Apis dorsata* and *Apis florea*.
- The bee products namely bee pollen, royal jelly, propolis and bee venom can be produced well in J & K region. The low temperature prevailing in Kashmir region will favour production of royal jelly. The royal jelly powder produced by drying royal jelly (by freeze drying method) can be sold at more than Rs.25,000 per kg. The University can support beekeepers in this. Honey production is not hampered by extracting royal jelly. Bee venom can be collected using venom extractor. Bee venom has a market value of Rs.12 lakh per kg. Propolis is also collected by bees in large amounts in the forest trees in this area. Propolis can be sold at Rs.1,500 to Rs.5,000 per kg. Bee Pollen particularly from saffron can be produced in this region which can fetch about Rs.10,000 per kg. Bee Pollen has to be dried immediately after collecting.
- J&K Khadi & Village Industries Board has played a pioneering role in development of Bee Keeping in the State & has provided hand holding support to Bee keepers from 1969.
- There is a very high concentration of beekeepers in the districts of Anantnag, Kulgam, Pulwama, Srinagar, Bandipora, Samba, Kathua, Ramban, Udhampur & Jammu and as per survey of Agriculture Department, there are more than 2564 full time Bee-Keepers located in these districts.
- The availability of abundant nectar producing flora like Acacia, *Plectranthus*, mustard, clover, saffron, eucalyptus, berseem, temperate fruit crops along with fresh running water and fresh water lakes make the area a natural heaven for bee- keeping activity.

## 5.2 Issues or constraints in beekeeping in J&K region

- Uprooting, cutting and burning of *Plectranthus rugosus* (Sollai) which is an important bee forage plant of the region. Similarly uprooting and cutting of Acacia, another important bee forage plant. There is also loss of habitat of honey bees and loss of nectar corridors.
- Subsidy component is meagre, No insurance coverage or incentive is provided to beekeepers for migration of bee colonies insurance coverage.
- Rising cost of bee hives and other honey bee related tools.
- Non availability of disease diagnosis and investigation centres.
- Indiscriminate use of pesticides on horticultural and agricultural crops leading to mortalities of bee live stock thus discouraging bee-keeping.

- Lack of coordination among beekeepers during migration of bee colonies leading to particular places resulting in overcrowding of apiaries.
- Wasp and mite problems in honey bees that need research focus
- Non-availability of genetically superior queens for increased honey production
- Lack of adequate honey processing, packing and testing facilities.
- Inadequate marketing facilities and lack of assured market price resulting in low earnings.
- Migration is difficult and costly in the hilly terrain in J & K state, lack of insurance coverage to beekeepers and bee colonies, bees being stopped for long periods during migration at check posts in spite of possessing ID cards.

### 5.3 Suggestions to mitigate the issues/constraints in beekeeping

- Large scale plantation of *Aesculus indica* (Han Doon) & *Rubenia pseudoacacia* (Keekar). Promotion and development of bee flora by taking up social forestry. Chestnut and Capria if cultivated on large scale can be useful to honey bees as forage.
  - Floral calendar must be provided to beekeepers to enable migration at appropriate time to enhance honey production and crop pollination.
  - Need to highlight superior quality of Kashmir honey to develop geographical indication based on WTO rules.
  - Arrangement of regular training programmes for beekeepers.
  - Beekeepers of different parts of the country collaborate and develop beekeeping in the nation.
  - The government instead of supplying bee colonies to farmers which the farmers are unable to maintain, can provide rent to beekeepers for keeping their boxes in apple orchards for pollination. This way they can avoid loss of bee colonies.
  - Diversification of bee products is essential for high returns and sustainability.
  - Progressive Beekeeping Project has been proposed by KVIB. On the basis of distribution of bee flora/ forage & keeping in view the viability of bee farming in the said villages, Honey Villages have been identified for adoption with the help of SKUAST-K. In each honey village 25 bee keepers (aspirant bee keepers) shall be identified preference shall be given to unemployed educated youth. 25 Apiaries shall be established by the beekeepers in each honey village and every apiary shall comprise of 50 number of bee colonies. Awareness and sensitization camps, training & skill up-gradation of beekeepers, field visits & practical training, supply of bee hives & beekeeping equipments, establishment of satellite common facility centre, support in migration, marketing of honey, and employment generation will be done in the project.
6. Shri Ratan P. Watal, Member Secretary, EAC-PM in his concluding remarks explained the background leading to establishment of the Beekeeping Development Committee by the EAC-PM. Dr. Manzoor Paray, In-charge of RTCPPPM, SKUAST-K conveyed thanks to Shri Watal, Shri Rajeswara Rao and other participants in the meeting.

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**Fifth meeting of the Beekeeping Development Sub-Committee: 1 under the  
Chairmanship of Shri Ratan P. Watal, Member Secretary, EAC-PM on 15th November  
2018 at Sher-e-Kashmir University of Agriculture and Technology for Kashmir  
(SKUAST- K) Srinagar**

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**List of participants**

1. Shri Ratan P. Watal, Member Secretary, EAC-PM
2. Shri K.Rajeswara Rao, Adviser, EAC-PM
3. Dr. B.N.S. Murthy, Horticulture Commissioner, MoA&FW, New Delhi
4. Dr. B.L. Sarswat, Executive Director, National Bee Board, MoA&FW, New Delhi
5. Prof. Dr. Nazeer Ahamed, Vice Chancellor, SKUAST-K , Srinagar
6. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore (Convener)
7. Prof. M.Y. Zargar, Director of Research, SKUAST-K , Srinagar
8. Dr. M.A. Paray, Incharge, RTCPPPM, SKUAST-K, Srinagar and 4 other scientists from the unit
9. Shri Abid Alaum Shah, KVIB, Srinagar
10. Shri Rasliuda Quad, SEC/CEO, Srinagar
11. Shri A. Dhandayuthapani, Beekeeper, Erode, Tamil Nadu
12. Shri Jaidev Singh, MD, Ambrosia Natural Products CTS India Pvt Ltd,
13. Shri Devvrat Sharma, Hitech Natural Products Pvt Ltd.
14. Shri Noor Mohammad, H.O, Valley Apiaries and Food Products, Pulwama, Kashmir
15. Shri Riyaz Ahmad, Apiculture Development Officer, Srinagar
16. Shri Mohammad Rafiq Kakru, Apiculture Development Officer, Baramulla
17. Shri Hassan Zanbar, ADO, Kupwara
18. Shri Zahean Ah, ADO, Ganderbad
19. Shri Mauzca Ah.Bhat, ADO, Anantnag
20. Shri Mohammed Shah Khan, ADA, Kulgam
21. Shri Mountyaan Ah Resai, ADO, Kulgam
22. Shri Zulfoar Ahamad, ADO, Budgam
23. Shri Syad Kokhlav Ahmad, Beekeeper, Kupwara
24. Beekeepers from Bandipore - Shri Gniun Noor, Shri Nashimullah Shah, Shri Mohammad Ali Shah Shri Daufan Shah and Shri Rahim Ali

25. Beekeepers from Srinagar - Shri Muzathul Hussain, Shri G.Ahmad Najan, Shri Yousuf Pajam, Shri Shahmazen Shafi, Shri Safoora Shafi, Shri Mubhashir Mushtaba, Shri Rabiya Shafi, Shri Tawfeaq Yousuf, Shri Ishfan Ahmad, Shri Tabusurn shoukat, Shri Sheigta Yousuf and Shri Faswart Rebou,
26. Beekeepers from Budgam - Shri Abdul Rashid and Shri Tariqah Dar,
27. Beekeepers from Baramulla - Shri Monal sideep, Shri Jabbar Wauri, Shri Hassin wauri, Shri Fawell Bhat, Shri Syed Samev Rizvi and Shri Habibulla Bhat
28. Beekeepers from Leh - Shri Mohammad Abbaz, Shri Istilul Aul and Shri Mohammed Aumi



## ANNEX 12

**Government of India**  
**Economic Advisory Council to the Prime Minister**  
**NITI Aayog Bhawan, Parliament Street, New Delhi - 110 001**

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**Record note of discussions held during sixth meeting of the Beekeeping Development Sub-Committee: 1 under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on 5<sup>th</sup> December 2018 at Krushi Bhavan, Bhubaneswar, Odisha**

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1. Sixth meeting of the Beekeeping Development Sub-Committee: 1 covering Odisha and adjoining States in Eastern Region was held under the Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM on 5<sup>th</sup> December 2018 at Krushi Bhavan, Keshari Nagar, Bhubaneswar, Odisha. List of participants is enclosed.
2. A National Level Consultative Workshop on “Beekeeping for Enhancement of Crop Productivity & Income” was conducted on the day of the meeting and stakeholders were invited from across the State of Odisha and other States in Eastern Region. An exhibition of beekeeping activities of Odisha State was also displayed.
3. Dr. Saurabh Garg, Principal Secretary, Agriculture & FE, Government of Odisha welcomed Dr. Bibek Debroy, Chairman, EAC-PM, Shri Ratan P. Watal, Member Secretary, EAC-PM and Shri K. Rajeswara Rao, Adviser, EAC-PM and other dignitaries/delegates to the meeting. Dr. M.R. Srinivasan, Convener of the Sub-Committee: 1 of the Beekeeping Development Committee made a presentation covering the technical details based on the Terms of Reference of the Committee.
4. Dr. Bibek Debroy, Chairman, EAC-PM and Chairman, BDC inaugurated the meeting/workshop/exhibition. Shri Ratan P. Watal, Member Secretary, EAC-PM and Shri K. Rajeswara Rao, Adviser, EAC-PM gave their remarks during the meeting. Shri Tejeswar Parida, President, KVIC, Odisha; Shri Debabrata Sahoo, Progressive Bee Farmer from Odisha State; Prof. S. Pasupalak, Vice-Chancellor, OUAT, Bhubaneswar; Dr. G.K. Dhal, APC, Odisha; Shri Devvrat Sharma, Beekeeping Expert from UP; Mrs Annapoorna, Beekeeper from Puri District of Odisha; Shri Debbrat Mallik, Beekeeper; Shri Shatrughan, Beekeeper; Dr. Manoranjan Mishra, Beekeeper; Dr. Mahapatra, NGO; Dr. C.R. Satpathy, Professor of Entomology (Retired), OUAT, Bhubaneswar; Dr. P.K. Roul, DEE, OUAT; Shri P.K. Upadhyay, Director of Horticulture, Government of Odisha spoke on the status and constraints of beekeeping in Odisha and Eastern India and also suggested measures to overcome constraints.
5. Following emerged during the meeting:

### **5.1 Status of beekeeping in Odisha State**

- All the honey bee species are found in Odisha, the reason being that diverse groups of crops are found in the State. *A. mellifera* is not very successful. *A. cerana* has tremendous



scope. Recently, comb honey is being produced and sold.

- The Sacbrood virus disease of honey bees that affected Indian honey bees during the 90s made the beekeepers to take up *A. mellifera* beekeeping.
- There are about ten agro-climatic zones in Odisha. All types of plants and bees are present in this State. The State has great potential for beekeeping.
- Odisha has more area under forest. Enhancement of income of farmers and scheduled tribe people is very essential.
- One fourth of the population in Odisha are scheduled tribes while about 40% belong to SC and ST.
- Odisha State has made tremendous progress in agriculture. The income of the farmers has been doubled in the last 10 years. Crop productivity has increased immensely. Odisha stands third in rice production in India. Different crop-based mission-mode-projects are in progress in Odisha. The State also stands first in shrimp production. In the last few years, the production of orchids has also increased. The ongoing flower mission and organic agricultural mission can help beekeeping.
- The Odisha forest department collects honey from forest and hills and processes it. This is sold as forest honey.
- KVIB has trained 1362 farmers in 3 years. A seven day training to KVK scientists and beekeepers, was conducted, certificates were issued, beekeeping equipment, extractor, were distributed. About 5000 bee colonies with boxes were supplied.
- Under the ICAR -Experiential learning programme, beekeeping is a successful business model.
- There are KVKs in 21 districts which are involved in providing beekeeping training.

## 5.2 Constraints/issues in beekeeping

- Many a times honey bee boxes are supplied but no follow-up activity is taken up. More than 5000 honey bee boxes distributed why government departments are lying without honey bees. The government departments are also overburdened in providing boxes and training to the beekeepers. The government departments have funds but lack convergence.
- Pesticide spray is a major problem to the honey bees. Coordination between farmers and beekeepers is essential.
- Every year bee colonies are lost in cyclone. There are no insurance policies to protect the honey bees and beekeepers.
- When government provides subsidy for supply of honey bee colonies, the beekeepers are not able to pay even the subsidised cost of the colonies.
- Banks do not finance beekeepers since they are landless.
- Farmers are not much aware about the benefits of beekeeping.
- There are not many bee forage plants in Odisha.

- Beekeepers are not aware of registration with National Bee board.
- The honey price has fallen due to adulteration and sale of fake honey.

### 5.3 Suggestions to overcome the constraints/issues in beekeeping

- A model of convergence among departments is lacking at present and is needed. Beekeeping has to be inculcated to the farmers.
  - Investment in terms of schemes is essential.
  - There must be the single window system in distributing the honey bee colonies.
  - There must be minimum support price for honey.
  - In the Koraput and Malkangiri districts which are affected by left wing Moaism, beekeeping can help in bringing them back to normalcy.
  - Mini honey processing plant can be set up in a vacant place in KVIB, Odisha. It is requested that the centre will fund it while Agri department of State Government will look after.
  - Honey parlour can be set up in a prime location.
  - The KVIB has about 700 acre of medicinal plants garden. Model project of beekeeping can be established there. Beekeepers can be encouraged to keep their hives in the garden. Odisha will become honey surplus state.
  - The skill and knowledge of the tribal people have to be protected and taken forward. Entrepreneurs must establish honey processing plants in forest areas and collect and process honey.
  - Bee friendly crops are needed for Odisha. Crops such as mustard and sunflower have to be cultivated so that honey bees can get their food. Floral calendar is essential to plan migration.
  - It is essential to educate school students at the stage of 8th or 9th standard on the benefits of beekeeping.
  - It is essential not only to educate farmers but also government officials and bankers on the usefulness of beekeeping.
  - Unifloral stingless bee honey can be produced.
  - Little bees (*A. florea*) can be used in pollination -
  - The National Bee Board funded IBDC is essential for Odisha. Honey testing laboratory as per FSSAI standards is needed in this state.
6. Shri P.K. Upadhyay proposed „Vote of Thanks“ to Dr. Bibek Debroy, Chairman and Shri Ratan P. Watal, Member Secretary, EAC-PM and other participants in the meeting.

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**Sixth meeting of the Beekeeping Development Sub-Committee: 1 under the  
Chairmanship of Dr. Bibek Debroy, Chairman, EAC-PM held on 5th December 2018 at  
Krushi Bhavan, Bhubaneswar, Odisha**

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**List of participants**

1. Dr. Bibek Debroy, Chairman, EAC-PM
2. Shri Ratan P. Watal, Member Secretary, EAC-PM
3. Shri K.Rajeswara Rao, Adviser, EAC-PM
4. Dr. Saurabh Garg, Principal Secretary, Agriculture & FE, Government of Odisha
5. Dr. G.K. Dhal, Agrl. Prod'n. Commissioner, Government of Odisha
6. Shri Tejeswar Parida, President, KVIC, Government of Odisha
7. Prof. S. Pasupalak, Vice-Chancellor, OUAT
8. Dr. B.K. Upadhyaya, Director, Horticulture, Government of Odisha
9. Dr. M.R. Srinivasan, Professor of Entomology, TNAU, Coimbatore (Convener)
10. Dr P.K. Roul, DEE, OUAT, Bhubaneswar
11. Dr. C.R. Satpathy, Professor of Entomology (Retired), OUAT, Bhubaneswar
12. Shri Devvrat Sharma, Beekeeping Expert, UP
13. Shri Debabrata Sahoo, Progressive Bee Farmer, Odisha
14. Dr. Mahapatra, NGO - „Centre for Bee Research“, Odisha
15. Dr. Manoranjan Mishra, Beekeeper, Odisha
16. Shri Debbrat Mallik, Beekeeper, Odisha
17. Shri Shatrughan, Beekeeper , Odisha
18. Mrs. Annapoorna, Beekeeper, Odisha
19. In addition, more than about 150 beekeepers from Odisha State

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