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1215 Mussel seed prospecting along Malabar Coast and the influence of rainfall

The green mussel *Perna viridis* forms a significant fishery along the Malabar coast. The green mussel forms extensive beds on the laterite and granite formations along Kasargod to Kozhikode in the intertidal and subtidal zones up to 15-20m depth. The major mussel beds in Kozhikode district are in south beach, Chaliyam, Elathur, Kollam, Moodadi, Thikkodi and Chombala constituting about 435 ha. Mussel bed off Mahe constitutes nearly 20 ha. The major mussel beds in Kannur district are along Thalassery, Thalai, Koduvally, Kadalai constituting 125 ha (Table 1). In Kasargod district, the mussel beds are off Chembarika, Kottikulam and Bekel constituting 40 ha. There is no significant mussel resource in Malappuram district. The total area of mussel beds along the Malabar Coast constitutes 620 ha. Spat settlement occurs on lateritic formations along south beach, Chaliyam, Elathur, Kollam, Moodadi and Thikkodi. Spat settlement on granite rocks are observed in Chombala, Mahe, Thalassery, Thalai, Koduvally, Kadalai, Chembarika, Kottikulam and Bekel.

Spat fall begins with the onset of monsoon when breeding and spawning occurs. Mussel seed availability, abundance and rainfall pattern along the Malabar Coast was surveyed

Table 1. Mussel seed settlement along Malabar coast indicating major settlement sites during November 2005, 2006

Zone / location	Estimated extent of mussel bed Ha	Mean mussel biomass per M^2 (Kg)		Estimated biomass (Tonnes)		Mean size of mussel seed (mm)		Mean weight of mussel seed (g)		Number of seed / kg		Size range (mm)	
		2005	2006	2005	2006	2005	2006	2005	2006	2005	2006	2005	2006
Kozhikode District													
South Beach	45	0.72	0.94	326	423	11.2	27.2	0.6	2.07	1228	483	11-24	16-41
Chaliyam	35	2.12	1.62	742	567	27.5	30.7	2.3	3.26	824	307	8-42	11-42
Elathur/Kollam	75	0.78	1.21	588	908	19.9	26.3	0.9	2.08	848	481	11-31	11-45
Moodadi	160	0.56	0.47	90	75	19.6	22.3	0.8	1.16	704	862	7-30	8-33
Thikodi	80	2.76	1.06	2208	848	30.1	26.8	2.9	2.25	736	444	17-43	16-44
Chombala	40	0.85	0.46	339	184	22.0	24.5	1.3	1.56	696	641	8-36	15-40
Mahe	20	0.72	1.08	144	216	27.2	21.4	2.6	1.09	264	917	10-43	8.48
Kannur District													
Thalassery/Thalai	50	0.59	0.82	297	410	18.8	24.2	0.9	1.5	600	667	6-33	9-42
Koduvally	50	0.50	1.16	252	580	19.4	21.8	1.0	1.18	480	847	9-32	6-38
Kadalai	25	1.11	1.32	278	330	24.0	26.5	2.0	2.07	508	483	9-44	9-40
Kasargod District													
Chembarika	18	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns	Ns
Kottikulam	18	2.84	Ns	497	Ns	35.7	Ns	4.0	Ns	664	Ns	23-48	Ns
Bekel	5	2.44	Ns	122	Ns	27.0	Ns	2.9	Ns	904	Ns	10-45	Ns
Total	620			5883	4541								
Average		1.33	1.01				21.7	25.2	1.7	1.82	650	613	6-48

Ns : Not Sampled

from Kozhikode to Kasargod districts during 2005 and 2006 to analyze the influence of rainfall on spat fall pattern and abundance. Depending on the onset, intensity and pattern of rainfall, mussel seed prospecting can be done so as to predict the availability and abundance of mussel seed that can be exploited for suply to the farming sector.

The total biomass of mussel seed along Kozhikode, Mahe, Kannur and Kasargod Coast during November 2005 was estimated at 5883 t (Table 1). The mean mussel biomass in an estimated total mussel bed area of 620 ha was 1.3 kg m^{-2} (17.2%). The average number of seed per kiologram was 650. The mean size of mussel seed was 21.7 mm, ranging from 11 mm in south beach to 36mm in Kottikulam. The mean weight of mussel seed was 1.7 g, ranging from 0.6 g in South Beach and 4 g in Kottikulam.

The total mussel seed biomass along Kozhikode, Mahe and Kannur coast during November 2006 was estimated at 4541 t. The mean mussel biomass in an estimated total mussel bed area of 436 ha was 1 kg m^{-2} . Kasargod was not covered during sampling process during 2006. Chaliyam recorded the highest average biomass at 1.6 kg m^{-2} (15.8%) followed by Kadalai at 1.3 kg m^{-2} (12.9%). The mean number of seed per kilogram was 613 and the mean size of mussel seed was 25 mm, ranging from 6 mm in Koduvally to 48 mm in Mahe. The mean total weight of mussel seed was 1.8 g, ranging from 1.09 g in Mahe to 3.26 g in Chaliyam.

During 2005, total annual rainfall in Kozhikode was 2236 mm, with mean monthly rainfall of 186 mm. Maximum rainfall was recorded during June (677mm) and July (417 mm). Intense rainfall extended up to November. The mean maximum atmospheric temperature during 2005 was 32.66 ^{o}C and mean minimum atmospheric temperature 23.61^{o}C. Total annual rainfall in Kannur was 2460 mm, with mean monthly rainfall of 205 mm. Maximum rainfall was recorded during June (684mm) and July (551mm). Intense rainfall extended up to November. The mean maximum atmospheric temperature during 2005 was 32.28 ^{o}C and mean minimum atmospheric temperature 24.2 ^{o}C. Total annual rainfall in Kannur was 3941 mm, with mean monthly rainfall of 328 mm. Maximum rainfall was recorded during June (1014mm) and September (692 mm).Intense rainfall extended up to November. The mean maximum atmospheric temperature during 2006 was 32.9 ^{o}C and mean minimum atmospheric temperture 23.2 ^{o}C.

Although 14% more rainfall was recorded in Kozhikode and Kannur during 2006, compared to 2005, mussel seed settlement was 23% lower than the previous year. The mean annual rainfall and mean monthly rainfall also was higher during 2006 compared to 2005. The mean maximum and mean minimum atmospheric temperatures recorded were also comparatively higher. These factors and the

more intense rainfall during 2006 probably affected the spat settlement adversely. The mussel larvae which remain pelagic for nearly 21 days were probably drifted away due to the continuous rains and turbulence failed to transform to pediveligers and settle on suitable substrata.

On the other hand, the rainfal during 2005 had at least two short spells which probably facilitated the larval settlement as well as subsequent spawnings. A significant feature of mussel spat settlement during 2005 was the occurrence of at least 4 different size groups of spat from August through December which occurred as a result of repeated spawnings and settlement. As a result seed was available up to December 2005 to the mussel farmers. Mussel seeding in the estuaries of Malabar usually begins during December / January.

The estimated mussel seed biomass during November 2006 was 454 t from Kozhikode, Kannur and Mahe. Assuming that about 15% of the estimated total is used for seeding for mussel culture in the estuaries in Malabar, 681 tonnes of seed would be available for farming. The total length of rope that can be seeded with this quantity of seed would be 272400 m, at the rate of 2.5 kg seed per meter of rope. About 2724 farmers can do mussel farming at the rate of 100 m of seeded rope per farmer. Nearly 1200 farmers are expected to set up mussel farms in 2006-2007 in Padanne, Dharmadom, Valapattanam, Mahe, Korapuzha, Kadalundi, Chaliyar and Moorad estuaries. Given this scenario, although spat settlement is poor relative to the previous year, there is sufficient quantity of seed that can be used for farming. However in 2006, seed was available only up to mid-December. Farming in most estuaries in Malabar can be done only by December end / January when higher salinity suitable for farming prevail. Thus farmers faced acute shsortage of seed supply for farming during 2006. This has also led to exorbitant prices for the seed (Rs 10/kg). The farmers are switching over to on-bottom culture instead of the suspended (rack) culture by stocking large sized mussels (60-70 mm, retarded mussels of previous years' settlement) which fail to attach to ropes causing significant loss due to high rate of slippage.

The mussel farming sector now faces twofold problem in acquiring seed for farming in the estuaries. a) Mussel spat settlement has been relatively poor and not available during the mussel farming season. b) The mussel pickers are unwilling to supply seed to the mussel farmers. They sort the seed picked along with adults and put it back in the mussel beds. These factors have caused severe pressure on the mussel farmers due to non-availability of adequate quantities of seed for seeding

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