

Proceedings of Workshop on Development and Application of Potentially Important Jute Geotextile in the area of Road Construction and Slope Stabilization

Inaugural Session:

The workshop was held on 15th September 2014 at 10.30 AM in the Wenlocks Hall of Hotel Gem Park, Udthagamandalam. Dr.O.P.S.Khola, Principal Scientist & Head, CSWCRTI Research Centre, Udthagamandalam welcomed the dignitaries and participants.

Dr. S. Manivannan, Senior Scientist and Principal Investigator of prototype field study, CSWCRTI Research Centre, Udthagamandalam stated that this workshop aims to bring awareness among the practicing engineers about use of JGT for road construction and slope stabilization. He appealed to the participants of four southern states (Tamil Nadu, Karnataka, Kerala and Andhra Pradesh) to encourage the application of JGT for slope management and road construction and insisted for its large-scale application. He informed the gathering that application of JGT on slope stabilization research work has been taken up in Dehradun, Chandigarh and Udthagamandalam centres under CSWCRTI where various types of JGT were put to trial.

Mr. A. Bhagat, Deputy Chairman, Indian Jute Mills Association (IJMA), Kolkata appreciated the efforts in conducting workshop and popularizing the JGT for road construction, slope stabilization and river bank protection among the user groups. He mentioned that though the efficacy of JGT is well established its application is not well practiced. He informed that Indian Jute mills Association is ensuring the availability of JGT in time and quality. The quality of the JGT would be evaluated by two well equipped laboratories set up by IJIRA and DJFT, IJT, CU.

Dr. P.K. Mishra, Director, CSWCRTI, Dehradun spoke about the importance on application of JGT for soil and water conservation. He informed that ICAR is involved in research work on jute production and product development under Central Research Institute on Jute and allied Fibers, Barrackpore (CRIJAF) and National Institute of Research on Jute and Allied Fibre Technology (NIRJAFT), Kolkata, respectively. CSWCRTI is involved in the research on application of JGT for erosion control and will continue to work on various aspects of application of JGT for soil and water conservation. The institute is also planning to utilize the JGT for reclaiming ravine area through our research centers located at Kota, Rajasthan, Agra, UP and Vasad, Gujarat. Similar research work can be extended to Tribal areas from our research centre located at Koraput, Odhisa for use of jute for the advancement of Tribal community by linking Tribal Sub Plan (TSP). JGT can also be used for stabilizing of mine spoils through research work by our research centre, Bellary, Karnataka and control the landslides and slips through research work of our research centre at Chandigarh. He opined that there are many advantages in JGT, which has to be popularized in the field of soil and water conservation with the efforts of National Jute Board and CSWCRTI.

Mr. K. Ambalavanan, Executive Director, Tea Board, remarked that the India is rich with natural resources and wide variation in climatic conditions. Apart from the natural resources, after independence, human resources have also increased in terms of population. At the same time, pressure on natural resources has increased which is very much visible in recent years with climate change and natural disasters. He emphasized that application of Jute Geotextiles in the area of soil conservation and slope stabilization is very important to promote the vegetation in landslide / mass eroded areas. He also stated that National Jute Board and Tea Board should work together for enhancement of Tea Growth by application jute geotextiles.

Dr. Subrata Gupta, IAS, Jute commissioner, Ministry of Textile, Government of India inaugurated the workshop and delivered the inaugural speech. He said that JGT have been found to be highly effective in slope management and road construction. JGT have been approved by agencies like Central Road Research Institute (CRRI), Indian Road Congress (IRC) and the Bureau of Indian Standards (BIS). Ever since their introduction, JGT have been used in more than 150 projects in the area of road construction and slope stabilization in various part of the country. Good response was received towards use of JGT from various States and a special project is being implemented in the flood prone areas of North Eastern States.

Technical Session - I:

The first speaker of this session was Mr. A. K. Khasthagir, Project Manager, National Jute Board who presented a paper titled Introduction to Jute Geotextiles and over view on the activities of the project "Development and application of potentially important Jute Geotextiles". For strengthening of road Woven 724 gsm JGT, for slope management Open Weave 500, 600 and 700 gsm JGT and for riverbank stabilization Open Weave 627 gsm JGT is used. He mentioned that PwC has projected that the growth of JGT in 2018 will be around 10% out of the total geotextiles market. The project covers 27 trials out of which 17 in India and 10 in Bangladesh. He also informed that BIS has approved the JGT specifications for road construction, riverbank protection and slope management purposes.

The second speaker of this session was Mr. P.K. Choudhury, Project Coordinator, NJB who made presentation on use of JGT for road construction and dealt with some case studies on application of JGT in various application areas. He explained the properties, types and advantages of JGT. He said that JGT reduces the kinetic energy of raindrop when it is falling on the land; thereby, velocity of runoff is reduced and it acts as check dam. He clarified the various doubts raised by participants on application of JGT.

Dr. G.P. Juyal, Head (Retd.), Division of Hydrology and Engineering, CSWCRTI, Dehradun presented on Landslide rehabilitation and control in agricultural watershed. He explained that JGT can be used for stabilization of steep slopes (> 70%) and open mesh JGT or Soil Saver (density 500,600,700 gm/m², mesh size – 16 mm x 22 mm) were found suitable for erosion control. The cost of application of jute soil saver including minor SWC measures is around Rs.27, 000/ha. He informed that farmers can bring additional area under cultivation which was earlier abandoned and the farmer's participation in protecting the planted vegetation is also necessary. There is need for awareness and training of user agencies like Soil Conservation and Watershed Management, Roads, Railways, Forest, Mining and Irrigation departments especially for hilly terrains. Woven type JGT (soil saver) of 500-600 GSM is recommended for stabilization of steep degraded slopes for quick establishment of vegetation. However, in exceptional cases JGT of 700 GSM may be used.

Fourth speaker, Dr. S. Manivannan, Senior Scientist, CSWCRTI, RC, Udthagamandalam presented on Application of jute geo-textile for hill slope stabilization using tea and grass as test crops. He presented the results and findings of prototype field study conducted at CSWCRTI Research Centre, Udthagamandalam. He stated that jute geo-textiles out performed over control plot in all the cases. Even though, there was difference in the performance of JGT on reduction runoff and soil loss, there was no significant difference within different types of JGT on crop growth. However, keeping in view of economical benefit, 500 gsm open weave JGT is better for Tea establishments.

Interim results of the prototype type field study on use of JGT for slope stabilization with 60 and 90 % slopes, showed that the 500 gsm open weave jute geo-textiles and non woven JGT outperformed synthetic geo-textiles and control. The root growth and soil binding characters of the grass were better under open weave jute geo-textiles.

Technical Session - II:

Ms. Rumki Saha, Junior Executive, National Jute Board, Kolkata presented the topic on Economical and environmental advantages of using JGT in roads and hill slope management. She narrated the environmental advantages of JGT, vegetation growth and enhancement of hydraulic conductivity of soil, which improves soil quality. JGT can absorb water about 5 times its dry weight creating congenial microclimate ensuring quick growth of dense vegetation. It acts as mulch for increasing soil fertility, improves the root system of vegetation and improve the soil binding capacity.

Dr. V. K. Bhatt, Principal Scientist, CSWCRTI Research Centre, Chandigarh presented the paper entitled "Effectiveness of JGT in rehabilitation of severely degraded hill slope of Punjab Shivaliks". His experience showed that mass erosion was completely controlled by application 700 gsm JGT with vegetation establishment. He also stated that where ever grass slips and other plants were planted, a huge growth of vegetation was seen. Impact of treatment was more pronounced after three years of laying JGT. Soil erosion and landslide may drastically be reduced if applied in road sides of hill region, stream banks and on embankments.

At the end of Technical Session II, a brief Interactive Session was held where NJB representatives replied all the verbal queries expressed by the participants. The literatures provided to the participants of the workshop contained a feedback form to assess the acceptability of JGT among the participating engineers. Mr. A. K. Khastagir, Project Manager, NJB thanked all the participants for their keen interest on the subject and mentioned that out of the 74 feed-back forms received from the participants, in 57 cases, the participating engineers have evinced interest on use of JGT for road construction and slope management purpose. He further mentioned that specific queries raised in the 17 feedback forms would be duly replied by NJB and the same would be sent to the respective persons raising the query. A summary of the feedback received from the participants can be seen at Annexure – I.

Valedictory Session:

Mr. A. Bhagat, Deputy Chairman, Indian Jute Mills Association (IJMA), Kolkata stated that the IJMA will take all necessary steps to bring down cost of the jute geo-textiles and will provide all support to disseminate the application technologies of JGT. Smt. S. Kavitha, Project Director, District Rural Development Agency, The Nilgiris informed that slope stabilization is more important in Nilgiris as soil resources are degrading day by day. There is also need for technical clarification on advantages of jute geo-textiles over coir geo-textiles as coir is easily available in South India.

Dr. P. K. Mishra, Director, CSWCRTI Dehradun in his remarks mentioned that this seminar is an eye opener programme from which we got some recipe to think on geo textile materials for soil and water conservation. Apart from slope stabilization, JGT has to be focused for other production activities of agriculture. It should be user specific for whether the jute or coir has to be used in the field. Future research work has to be done with public-private partnership with cooperation of NJB. Recommendations from research work are needed much for land, soil and crop specific so that the policy can be made for implementation in the field. Capacity building programme also needed for application of JGT to the public more specifically to hilly areas. We have to address the fire, theft and termite attack problems before up scaling these technologies in larger scale.

Mr. Srinivas R Reddy, Project Director, HADP, The Nilgiris stressed the importance of application jute geo-textiles in Nilgiris hills as landslides, poor land management and urbanization in steep slopes and faulty agricultural practices along the steep slopes are the major problems in the region. He mentioned that research is needed as to whether jute or coir to suit the local conditions as jute degrades early than coir. He informed that soil conservation and disaster mitigation are the two components of HADP and any research work related to this aspect, HADP is will fund for those studies.

Dr. Subrata Gupta, IAS, Jute commissioner concluded the workshop and stated that either jute or coir can be used for slope stabilization or road construction depending on suitability but we should avoid using synthetic material which is not fit for the ecosystem. He said that for any clarification regarding use of JGT, National Jute Board can be contacted and Indian Jute Mill Association can be contacted for requirement of JGT. He also expressed that there should be continuous collaboration between National Jute Board and CSWCRTI in research and capacity building in the area of application of jute geo-textiles for slope stabilization.

There were 166 participants were attended from Tamil Nadu, Andhra Pradesh, Karnataka and Kerala including 25 participants from press and media. Out of 166 delegates, 98 were engineers working in the areas of road construction and slope stabilization.

One special session was organized to interact with press and media and 25 reporters from various Newspapers and Audio-Visual Medias were present during the press meet. Dr. Subrata Gupta, IAS, Jute Commissioner, NJB, Kolkata, Dr. P. K. Mishra, Director, CSWCRTI, Dehradun. Mr. R. Ambalavanan, IA&AS, Executive Director, Tea Board, Mr. A. K. Khastagir, Project Manager NJB, Mr. P. K. Choudhury, Project Coordinator, NJB, Dr. O. P. S. Kholia, Head, CSWCRTI RC and Dr. S. Manivannan, Senior Scientist and Organizing secretary were present at the press meet.

Recommendations:

A few recommendations that emerged out of the discussions and deliberations held in the Workshop are as under:

1. Future research work has to be done with public-private partnership with cooperation of NJB. Recommendations from research work are needed much for land, soil and crop specific so that the policy can be made for implementation in the field.
2. Soil conservation and disaster mitigation are the two components of HADP and any research work related to this aspect, HADP is will fund for those studies.
3. There should be continuous collaboration between National Jute Board and CSWCRTI in research and capacity building in the area of application of jute geo-textiles for slope stabilization.
4. There is need for awareness and training of user agencies like Soil Conservation and Watershed Management, Roads, Railways, Forest, Mining and Irrigation departments especially for hilly terrains.
5. CSWCRTI is planning to utilize the JGT for reclaiming ravine area through our research centers located at Kota, Rajasthan, Agra, UP and Vasad, Gujarat. Similar research work can be extended to Tribal areas from our research centre located at Koraput, Odhisa for use of jute for the advancement of Tribal community by linking Tribal Sub Plan (TSP).
6. JGT can also be used for stabilizing of mine spoils through research work by CSWCRTI Research Centres like Bellary, Karnataka and control the landslides and slips through research work of our research centre at Chandigarh.
7. National Jute Board and Tea Board should work together for enhancement of Tea Growth by application jute geo-textiles.
8. IJMA will take all necessary steps to bring down cost of the jute geo-textiles and will provide all support to disseminate the application technologies of JGT.
9. More Awareness Workshop is needed in the southern States to promote use of JGT and such Awareness Workshop should be followed by visit to field sites where JGT has been applied to address soil related problems.

The workshop ended with vote of thanks proposed by Dr. K. Kannan, Senior Scientist, CSWCRTI RC, Udhagamandalam.

Field visit:

A visit was arranged to inspect the field trial sites under the CFC project by Jute Commissioner, Director, CSWCRTI and the representatives of NJB and CSWCRTI on 16th September, 2014. A wrap-up meeting was taken by Jute Commissioner to discuss on the future activities under the project and various aspects on application of JGT to address soil related problems in the southern States.

Summary of the Feedback received**Participants who are convinced about efficacy of JGT and interested in giving trials**

| Sl. No. | Name | Designation & Department represented | Contact details |
|---------|--------------------|---|---|
| 1. | UmeshBhaty | Assistant Executive Engineer PWD, Govt. of Karnataka | Email- umeshbhaty@gmail.com Ph - 09448844028 |
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| 4. | Er. N. Kumar | Assistant Engineer Agricultural Engineering Department, Ooty, TN | Email- abirankr@yahoo.com Ph - 09443461596 |
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| 8. | Vijayakumar | Assistant Director Highways Department | Email- adhrlebe@gmail.com Ph - 09443055380 |
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| 13. | C Sudhakar Reddy | Assistant Executive Engineer Panchayat Raj | Email- sudhakareddi@gmail.com Ph - 09440941400 |
| 14. | Dr. Harsh Mehta | Project Scientist CSWCRTI, Dehradun | Email- harshmehta41@rediffmail.com Ph - 09411339671 |
| 15. | N Gnanasekar | Assistant Executive Engineer Rural development & Panchayat Raj, Chennai | Email- gnanasekarparvathy@gmail.com Ph - 09486927877 |
| 16. | K. K. Babu | Assistant Executive Engineer Rural development & Panchayat Raj, TN | Email- kkbabu6919@gmail.com Ph - 09443541821 |
| 17. | G. N. Subramani | Assistant Executive Engineer Agricultural Engineering Department, TN | Ph - 09443372336 |
| 18. | S Chandrasekhar | Assistant Executive Engineer Agricultural Engineering Department, TN | Email- chandru57sekhar@gmail.com Ph - 09843527693 |
| 19. | M RangaBoju | Assistant Executive Engineer Agricultural Engineering Department, TN | Email- rangaboju@gmail.com Ph - 08098468054 |
| 20. | M Sanjay Sarkar | Factory Advisory Officer Tea Board of India | Email- sanjaysarkarm@gmail.com Ph - 07373524843 |
| 21. | Devaraj K | Junior Engineer Panchayat Union, Kotagiri, Nilgiris | Ph - 09442367565 |
| 22. | M Ram Deepak Reddy | Assistant Executive Engineer Panchayati Raj Engineering Department | |
| 23. | S Poorani | Assistant Executive Engineer PWD/ WRO, TN | Email- pourani_200@yahoo.com Ph - 09840470720 |

| Sl. No. | Name | Designation & Department represented | Contact details |
|---------|---------------------------|--|---|
| 24. | ErPremanand B Dashavant | Assistant Professor Dept. of Soil & Water Engineering University of Agricultural Sciences, Raichur, Karnataka | Email- premanand34@gmail.com Ph - 09886927776 |
| 25. | K Ramana Reddy | Assistant Engineer Panchayat Raj Department | Ph - 09703666567 |
| 26. | N Mounagrvvsamy | Assistant Engineer Rural development &Panchayat RajDept, TN | Ph - 07402608719 |
| 27. | G R Suganthi | Assistant Executive Engineer TN PWD / WRO | Email- grsuganthee@gmail.com Ph - 09444257990 |
| 28. | S Krishna Prakash | Assistant Engineer Rural development &Panchayat Raj | Email- srkrishnaprakash11@gmail.com Ph - 07402608704 |
| 29. | S Manirandan | Assistant Engineer DRDA | Email- manibandandbit@gmail.com Ph- 07402608718 |
| 30. | M Suguna | SMS (Horticulture) UPASI – KVK, Coonoor | Email- suguna@mail.com Ph - 09442792298 |
| 31. | B Sivakumar | | Email- bsivakumar1975@gmail.com Ph - 09443842323 |
| 32. | A Valliemmai | Assistant Professor | Email- vallimei@gmail.com Ph - 09894870483 |
| 33. | P Nagaraj | SMS Agricultural Engineer Sri Avinashilingam KVK Coimbatore | Email- pnagrajju@gmail.com Ph - 09952339747 |
| 34. | Dr R. M. Jayabalakrishnan | Assistant Professor (Environmental Sciences) Horticultural Research Station, Ooty | Email- jayabalphd@yahoo.com,jayabalphd@gmail.com Ph - 08148095422 |
| 35. | N Pankajavalli | Junior Engineer HADP, Ooty | Ph - 09443042221 |
| 36. | Shivanand S Banakar | Superintending Engineer PRE Circle, Davangere, Karnataka | Ph - 09449599407 |
| 37. | L Jothilingam | Assistant Engineer Rural development &Panchayat Raj, TN | Email- jothilingam14@gmail.com Ph - 09790415505 |
| 38. | Ravikumar R | ADE, Highways, Nabard and Rural Road, Pollachi Highway Department, TN | Email- adehnandrrpollachi@gmail.com Ph – 09443378090 |
| 39. | M MurugaBoopathi | Assistant Divisional Engineer Highways Dept. | Email:mmurugaboopathi@yahoo.com Ph – 09443413328 |
| 40. | N. T. Suresh | Assistant Executive Engineer PWD, Go Karnataka | Email- aeestp@kpwd.gov.in Ph – 09448050069 |
| 41. | P Asokan | Assistant Executive Engineer DRDA, Kottagiri | Ph – 09486157555 |
| 42. | L Jayaram | Executive Engineer KRRDA, Karnataka | Email- jayarambk@gmail.com Ph – 09901655668 |
| 43. | R Durga Prasad | Assistant Engineer PanchayatRaj Engineering Department Andhra Pradesh | Email- ratakonda.durga@gmail.com Ph – 09440431678, 09701364314 |
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| 45. | V Senthil Kumar | Assistant Engineer Rural development &Panchayat Raj Dept, TN, The Nilgiris | Email- senthilsripro@gmail.com Ph – 09842270136 |
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| Sl. No. | Name | Designation & Department represented | Contact details |
|---------|----------------|---|---|
| 47. | G Balachandran | Assistant Project Officer DRDA, The Nilgiris, TN | Ph – 09843506193 |
| 48. | Er T. Arul | Assistant Executive Engineer DRDA, Salem, TN | Email- arulshreehaa@gmail.com Ph – 07402606743 |
| 49. | S Anitha | Assistant Engineer Udhagamandalam Municipality | Email- anithasundar2004@yahoo.co.in Ph – 09442144888 |
| 50. | Kumara K | Executive Engineer PWD, Go Karnataka | Email- eekumarak@gmail.com Ph – 09686599666 |

NB: Participants at Sl. No. 41 - 50 are convinced about the efficacy of JGT and recommended for a two-day Workshop – one day for technical presentations and another day for field visit.

| Sl. No | Name | Designation & Department represented | Contact details | Comment/Queries |
|--------|--------------------------|---|---|--|
| 51. | V Selvi | Scholar CSWCRTI, Ooty | Email:sel-121968@yahoo.co.in Ph – 09486712450 | Should be tried for bench terrace stabilization in Nilgiri |
| 52. | Er R Rangasamy | Executive Engineer PWD, TN | Email: rangsugu59@gmail.com Ph – 09894627316 | New technology & interested in using |
| 53. | G Krishna Kumar | Assistant Executive Engineer Planning Formulation, PWD/WRO, Chennai | Email: cepf2007@yahoo.com Ph – 09444312448 | Good exposure of various applications with JGT |
| 54. | A Murugesan | Assistant Executive Engineer Town Panchayats, Udhagamandalam | Ph – 09442397327 | Fruitful Workshop. One more workshop to be arranged for base level engineering staffs in mother language |
| 55. | G Arumugam | Assistant Divisional Engineer Highways Dept, Go TN | Email: adehanaimalai@gmail.com Ph – 09443436663 | Useful for soil erosion control and can easily be adapted for rural roads other than SH, NH, ODR's. |
| 56. | Er D LowrduAruckia Kumar | Executive Engineer Agricultural Engineering Department | Email: dlakumar@gmail.com Ph – 09443857005 | Essential to keep this technology |
| 57. | M K R Veerabhadrachary | Assistant Executive Engineer PWD, Karnataka | Email: vchary1956@gmail.com Ph – 09480280570 | To be included in SoR |

NB: Participants at Sl. No. 51 - 57 are convinced about the efficacy of JGT and recommended its use in some specific fields.

Feedback from Participants with some specific comments/queries

| Sl. No | Name | Designation & Department represented | Contact details | Comment/Queries |
|--------|---------------------|---|--|--|
| 58. | T. M. Kumar | Assistant Engineer Rural Department | Email: t.m.kumar2015@gmail.com Ph – 09443091678, 7402608708 | Need some practical experiment at site |
| 59. | G Prameela | Assistant Divisional Engineer Highways Dept. | Email: pramilakarhigeyan@gmail.com Ph – 09443653908 | Application of JGT is limited to certain conditions of soil. But it is economical & eco-friendly |
| 60. | R Chandrasekhar | Executive Engineer, DRDA, Coimbatore | Email: chandra.arunafeb16@gmail.com Ph – 09443381271 | May be introduced in Building construction materials, to increase strength & longevity |
| 61. | T Rajasukar | Assistant Executive Engineer Rural Development | Email: aeegobi@gmail.com Ph – 07708288775 | Jute may be cheaper in Kolkata but not in TN. Banana fibre or coconut leaves may be preferred |
| 62. | S. Jayanthi | Assistant Engineer DRDA | Email: aeegobi@gmail.com Ph – 07402608705 | Need brief information of using OW JGT due to prone land sliding area |
| 63. | R Parthiban | Assistant Executive Engineer Rural Development, DRDA Coimbatore | Email: parkavi58@gmail.com Ph – 09443363262 | To be studied for any other building material |
| 64. | Dr Abdul Hakkim V M | Head, Dept of LWCRE, Kerela College of Agricultural Engg | Email: abdulhakkim19@gmail.com Ph – 09446279626 | More awareness to be organised in Kerala as it is landslide prone area. Extensive research activities to be done here |
| 65. | P Kartaikeyan | Assistant Engineer Highway Dept, TN | Email: karhec_avn@yahoo.com Ph – 09842018357 | Subgrade Stabilization may not be suitable for heavy traffic roads. Applicable for rural roads |
| 66. | M H Reddy | Assistant Executive Engineer Rural&PanchayatDept AP | Email: hm_marreddy@yahoo.com Ph – 09866257902 | -Suitability for BC soil be encouraged -use of JGT in any road layer to be encouraged -Selection of 1 BC soil treatment with JGT at Guntur, AP is suggested |
| 67. | Dr H V Ramanna | Associate Dean College of Agricultural Engg | Email: caemdkr@gmail.com Ph – 09440168633 | Can be used to conserve water in dryland for agricultural use |
| 68. | B.V. Jagadeesh | Executive Engineer KRRDA, davangere | Email: kn-dav 1 pmailnic.in Ph- 09449599459 | Field tests are conducted with conventional method but not with other innovative technologies. Simulations are to be exposed to engineers before implement. |
| 69. | Banumathi Ganesh | Asst. C.E, Nabard & RR Highways Dept. GOTN | | Raw jute can be used or not? Is CBR value increased after immediate application of JGT? Whether thickness of base & other layer reduced? How JGT reduce the cost of construction? |
| 70. | M.G. Suresh Naik | Asst. Engineer PMGSY, KRRDA | Email: sureshnaik1978@gmail.com Ph- 9964503641 | For CBR-4, GSB reduced to 50mm, but did not mention about 50 mm sand layer- please clarify. |

| Sl. No | Name | Designation & Department represented | Contact details | Comment/Queries |
|--------|-------------------|--|---|--|
| 71. | R.S.Kaaviyakannan | Asst. Engineer HADP, The Project Director, OOTY | Email:rskkannan@gmail.com Ph-9443274576 | Some suggestions – a) At least 1 trial plot in each panchayat level. b) Experimental results may be made known to justify the efficacy c) Modalities may be devised for implementation of JGT |
| 72. | K.R.Bharathi | Asst.Engineer, Panchayat Raj Engg.Dept, AP | Email: bharathi_k_r@yahoo.co.in Ph- 9441246882 | Introduction of JGT should be encouraged. Action to be taken to the JGT rate analysis in SSR of AP & Standard Datas. Usage of JGT in BC soils should be explained in detail, since in AP Coastal Districts dealing with BC soils |
| 73. | R.Sathiya | Asst.Engineer Highways Dept | Email: sathiya77@yahoo.co.in | Whether JGT can be used in clayey, Black cotton and highly cohesive soils for road construction. How the CBR value is increased using JGT either by layer theory or interactive theory. Where the Bitumen modified woven jute can be used? |
| 74. | Dr. P.Selvarambi | Asst. C.E (N & RR) Highways Deptt. Govt. Of Karnataka | Email: sundariselvam@yahoo.com Ph-09840724052 | More research on Plastic coated jutes and Impact of jute degradation with respect to type of soil etc. |

NB: All these queries are being replied by the Project Management Unit of National Jute Board.