

F.No.O-15012/61/18-G&R
Government of India
NITI Aayog
(Governance & Research Vertical)

Sansad Marg, New Delhi-110001

Dated the 19th February, 2019


Public Notice # 3

Sub: EoIs on Research/Study on each of the subjects as mentioned in Annexure-I and II (ToRs).

NITI Aayog invites Expressions of Interest (EoIs) for conducting research/study on the topic as mentioned in Annexure-I from institutions/organisations of repute (including universities/deemed universities). A brief scope/ToRs of the study proposed is also enclosed at Annexure-I. The detailed Research Scheme of NITI Aayog, 2018 (RSNA-2018) guidelines may be seen in the NITI Aayog website at <http://www.niti.gov.in/guidelines>

2. Here, the aim is to arrive at the policy prescriptions on the issue and to have more focused feedback for future policy-making. The Research/Study Proposals, for which EoIs are being invited, will be funded under the Research Scheme of NITI Aayog, 2018 (RSNA-2018) and its amendments, if any. All the institutions/organisations are requested to go through the Guidelines of the Research Scheme of NITI Aayog, 2018 (RSNA-2018) before responding to this public notice, especially to satisfy themselves that they fulfill all the eligibility criteria for availing of grant under the said scheme and also that they can conduct the research study project as per the guidelines.

3. The hard copy of EoI as per Annexure-II must be submitted by hand/by Registered post to Deputy Adviser (Governance & Research), Room#435, NITI Aayog, Sansad Marg, New Delhi-110001. The EoI must be sent in envelopes superscribed with the words "EoIs on (name of the topic, as mentioned in Annexure-I)" and the same must reach the NITI Aayog within 30 days of the notified date of Public Notice # 3. For any query in this regard, the Deputy Adviser (Research) (+91-11-23096725) may please be contacted over phone.


19 Feb 2019
(Dr. B. Bishoi)

Deputy Adviser (Research)

Annexures: As above

S.No.	Thrust areas/topics
1.	A Research Study on Mass Production of Manure/Fertilizer from Agricultural Bio-Mass"

Terms of Reference (ToR)

I. Background :

The commitment to attend sustainable development goals is today's global agenda. Agricultural sustainability is not only linked to farming in isolation but it includes the entire farm based operations. To this context, serious attention has been drawn to the policy makers and scientists globally to device suitable technologies for effective utilization of agricultural biomass as an important national resource since creating a wreaking havoc. This has become an imperative need in the backdrop of global quest for cleaner environment and greener world.

2. Globally, 140 billion metric tons of biomass is generated every year from agriculture. This volume of biomass can be converted into source of energy and raw materials. Inadequate management of waste agricultural biomass is contributing towards climate change, water and soil contamination and local air pollution. As raw materials, biomass wastes have attractive potentials for large-scale industries and community-level enterprises. Biomass aggregation includes residual stalks, straw, leaves, roots, husk, nut or seed shells, waste wood, animal husbandry, dairy, fisheries and aquaculture wastes. There is an emerging trend on the utilization of biomass conversion technologies from combustion of rice husk and sugarcane bagasse.

II. Aims & Objectives :

To develop a technology to convert crop bio waste (particularly of paddy) into farm compost in less than six months period with economically efficient methods.

To convert bio waste into wealth and offer economically viable alternative to prevent burning of crop residues, stubble etc.

Create possibility of giving an added value to the agricultural activity through the availability of an additional source of income for managing the treatment and selling resultant compost.

Availability of a new material to improve the soil fertility with the application of compost (in substitution of chemical fertilizers).

III. Opportunities & Challenges :

Burning of crop residues/ rice straw is common in north-western parts of India causing nutrient losses, and serious air quality problems affecting human health and safety. It causes severe pollution of land and water on local as well as regional and global scales. It is estimated that burning of paddy straw results in annual nutrient losses of 3.85 million ton of organic carbon, 59,000 ton of nitrogen, 20,000 ton of phosphorus and 34,000 ton of potassium at the aggregate – which can be effective resource for the farming sector. However, the other estimate indicates the loss of nutrients is in comparatively lower scale and the details of which is detailed below.

Loss of nutrients (million ton/ year) due to burning of crop residues

Sl	Crop residues	N Loss	P Loss	K Loss	Total
1.	Rice	0.236	0.009	0.200	0.45
2.	Wheat	0.079	0.004	0.061	0.14
3.	Sugarcane	0.079	0.001	0.033	0.84
Total		0.394	0.014	0.295	1.43

The challenge, therefore, is to convert agricultural biomass as a resource for energy and other productive uses and to explore capturing of best technologies available worldwide, especially those existing in developing countries, have the ease of access to information on these technologies. However, given that some technologies have incomplete data fields and there is a need to intensify and deepen research on the growing number of technologies. Data deficiencies may also be a serious challenge in a country like India, where more emphasis has been laid for solid waste management in contrary, rational management of agricultural biomass received comparatively less attention, which is required to be addressed.

According to the estimates of International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), this leads to nutrient loss from the soil which is equivalent to US \$18 million worth of urea.

IV. Relevance and Need of the Study :

In India, according to the MNRE, over 500 million ton of agricultural residues are produced every year. With increased production of rice and wheat, residue generation has also increased substantially. Cereal crops (rice, wheat, maize, millets) contribute 70% of the total crop residues *i.e.* 362 million ton comprising 34% by rice and 22% by wheat crops. The rice-wheat system accounts for nearly one-fourth of the total crop residues produced in India.

Crop-wise residue generated (million ton/ year) in various States of India :

Sl.	States/ UTs	Cereal Crops	Fibre Crops	Oil-seeds Crops	Sugarcane
1.	Andhra Pr.	33.07	16.07	2.50	5.80
2.	Aru Pr.	0.56	0.00	0.06	0.01
3.	Assam	8.15	2.01	0.29	0.41
4.	Bihar	19.87	3.27	0.20	1.87
5.	Chhattisgarh	8.87	0.01	0.11	0.01
6.	Goa	0.24	0.00	0.01	0.02
7.	Gujarat	8.18	28.62	5.06	5.85
8.	Haryana	24.73	7.58	2.15	1.93
9.	Himachal Pr.	1.95	0.00	0.01	0.02
10.	J&K	2.76	0.00	0.11	0.00
11.	Jharkhand	7.34	3.55	0.09	0.13
12.	Karnataka	11.73	0.01	0.81	8.80
13.	Kerala	1.14	3.51	0.00	0.10
14.	Madhya Pr.	16.05	19.51	2.13	1.12
15.	Maharashtra	8.75	0.00	0.57	22.87
16.	Manipur	0.78	0.13	0.00	0.01
17.	Meghalaya	0.44	0.00	0.01	0.00
18.	Mizoram	0.10	0.01	0.00	0.01
19.	Nagaland	0.89	0.56	0.06	0.07
20.	Odisha	13.38	9.32	0.16	0.24
21.	Punjab	45.58	2.96	0.08	1.76
22.	Rajasthan	22.19	0.00	9.26	0.15
23.	Sikkim	0.14	0.78	0.01	0.00
24.	Tamil Nadu	11.69	0.02	1.56	12.37
25.	Tripura	1.22	0.04	0.00	0.02
26.	Uttar Pr.	72.02	0.00	2.49	41.13
27.	Uttarakhand	2.40	24.43	0.03	2.11
28.	West Bengal	37.26	0.00	0.95	0.62
29.	A&N Islands	0.04	0.00	0.00	0.00
30.	Dadra & Nagar Haveli	0.05	0.00	0.00	0.00
31.	Delhi	0.17	0.00	0.00	0.00
32.	Daman & Diu	0.01	0.00	0.00	0.00
33.	Puducherry	0.10	0.00	0.00	0.00
All India (Total)		361.85	122.39	28.71	107.49

Note : Contribution of different crops categories in residue generation – cereals 58%, sugarcane 17%, oil-seeds 5% and fibres 20%; contribution of different cereal crops in residue generation – rice 53%, wheat 13%, maize 7% and millets 7%

Crop-wise production, residue generated :

Sl	Crop	Annual Prodn. (million ton/ year, 2014)	Dry residue generated (million ton/ year, 2014)
1.	Rice/ Paddy	153.35	192.82
2.	Wheat	80.68	120.70
3.	Maize	19.73	26.75
4.	Jute	18.32	31.51
5.	Cotton	37.86	90.86
6.	Groundnut	7.17	11.44
7.	Sugarcane	285.03	107.50
8.	Rapeseed Mustard	7.20	17.28
9.	Millets	18.62	21.57
Total		627.96	620.43

The surplus crop residues in some regions are typically burnt on-farm. The amount of surplus crop residues available is estimated between 84 and 141 million ton/ year (44.5 million ton rice straws and 24.5 million ton wheat straws), where cereals crops contribute 58%.

Crop residues burnt in various States of India (2008-09, in million ton/ year)

Sl.	States/ UTs	Residue burnt (IPCC)	Residue burnt (Country data)
1.	Andhra Pr.	12.60	5.29
2.	Aru. Pr.	0.16	0.05
3.	Assam	2.65	0.96
4.	Bihar	5.21	3.35
5.	Chhattisgarh	2.39	0.73
6.	Goa	0.17	0.03
7.	Gujarat	9.63	4.51
8.	Haryana	6.85	9.18
9.	Himachal Pr.	0.25	0.42
10.	J&K	0.47	0.23
11.	Jharkhand	1.90	1.28
12.	Karnataka	5.52	5.93
13.	Kerala	0.55	0.12
14.	Madhya Pr.	3.86	2.00
15.	Maharashtra	10.96	6.82
16.	Manipur	0.21	0.07
17.	Meghalaya	0.14	0.05
18.	Mizoram	0.03	0.01
19.	Nagaland	0.21	0.09
20.	Odisha	3.84	1.31
21.	Punjab	13.30	21.32
22.	Rajasthan	4.27	2.77
23.	Sikkim	0.02	0.01
24.	Tamil Nadu	5.57	3.37
25.	Tripura	0.63	0.11
26.	Uttar Pr.	22.38	22.25
27.	Uttarakhand	1.07	0.76
28.	West Bengal	14.85	5.43
29.	A&N Islands	0.01	0.00
30.	Dadra & Nagar Haveli	0.01	0.00
31.	Delhi	0.04	0.02
32.	Daman & Diu	0.00	0.00
33.	Puducherry	2.11	0.02
All India (Total)		131.86	98.49