PROFORMA FOR SUBMISSION OF
ANNUAL PROGRESS REPORT OF RESEARCH PROJECTS
PART -I: GENERAL INFORMATION

600 Project Code:
6001 Institute Project Code No. : CP 2.1.13
6002 ICAR Project Code No.

601 Name of Institute and Division
6011 Name & Address of Institute: Indian Grassland and Fodder Research Institute  Jhansi
6012 Name of Division /Section: Division of Crop production
6013 Location of Project: C.P. Division, IGFRI, Jhansi

602 Project Title: Fodder Based Contingent Crop Planning Modules for Rainfed Semi-Arid Region.

603 Priority Area Rainfed Production System

6031 Research approach

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<td>04</td>
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604 Specific Area Efficient Utilization of Farm Resources in Fodder based Contingent Crop Planning

605 Duration of project: 05 years

6051 Date of start of project: Kharif, 2010

6052 Likely date of completion of project: Rabi, 2014-15

6053 Period for which report submitted 2011-12

606 Total cost of the project: Rs. 45.06 lakh

6061 Expenditure to date: -
Summary Achievements:

Under rainfed conditions of Bundelkhand, the total green fodder equivalent yield was higher in Subabul + Sesame + Green gram, F - Barley + Linseed (232.24q/ha) and Subabul + Sesame + Black gram- Wheat + Mustard (230.58 q/ha). Adoption of intermittent dry spell management strategy (in situ weed mulching) recorded 10.93 percent higher green fodder equivalent yield than without management strategies (182.8 q/ha). During rabi season only hedge rows of perennial components (soobabool and sesbania) thrives well. Water balance study reinforce that both moisture adequacy index (MAI) and soil moisture index (SMI) during the period October (40th to 44th SMW) ranged from 50.0 to 23.7 %, thus the rabi crops were not sown. However, the rabi crops were sown in the first week of January since two storms were occurred (13.4 and 26.4mm). Further, the subsequent weeks did not receive any rainfall and abrupt rise in maximum temperature from 19.5 to 33.8 °C causes no further growth of crops.

Key words: Green fodder equivalent yield, intermittent management strategies, biomass yield, water balance, moisture adequacy index, soil moisture index, Rainfed, Bundelkhand.

PART -II: INVESTIGATOR PROFILE

Principal Investigator

6101 Name Dr. Anoop Kumar Dixit
6102 Designation Senior Scientist (Agronomy)
6103 Division/Section Crop Production Division
6104 Location Institute Campus
6105 Institute Address IGFRI, Jhansi-284003, Uttar Pradesh, India

Co-Principal Investigator

6111 Name Dr. Suchit Kumar Rai
6112 Designation Senior Scientist (Agro-meteorology)
6113 Division/Section Crop Production Division
6114 Location Institute Campus
6115 Institute Address IGFRI, Jhansi-284003, Uttar Pradesh, India
PART - III: TECHNICAL DETAILS

620 Introduction and objectives;

6201 Immediate objectives:
- To develop efficient crop planning for higher productivity with space and time under aberrant weather situations of rainfed semi arid region.
- To explore the possibility of growing profitable post monsoon crop(s) under rainfed fodder based cropping system for assured income.

6202 Long term objectives:
- To develop stochastic time series rainfall prediction model for better drought proofing and risk management.

6203 Specific objectives for the year as detailed in RPF-1
- To ensure the farm productivity of rainfed semi-arid region through fodder based efficient contingent crop planning under aberrant weather situations.

621 Project Technical Profiles:

6211 Technical Programme:

2. Contingent crop planning module II: - Under delayed onset of monsoon with/without intermittent dry spell and early/late cessation of monsoon.

Note:
i. Between 2 modules, only one will be tested in a year on the basis of onset of monsoon.
ii. Sowing of *rabi* season crop will depend on soil moisture availability at the time of sowing.

1. **Contingent Crop Planning Model-I**

**A) Efficient cropping system (Main plot)**

S1: Sorghum, F (Fodder) - Chickpea (*Farmers practice*)
S2: Sesame + Blackgram - Fallow (*Farmers practice*)
S3: Sorghum + Cowpea (F, ICMP-1)- Batra + Safflower (ICMP-2)
S4: Sesame + Greengram, F (ICMP-1)- Chinese cabbage, F + Safflower (ICMP-2)
S5: Sesbania + Sorghum + Guar (F, ICMP-1)- Lentil + Linseed (ICMP-2)
S6: Subabul + Sesame + Greengram, F (ICMP-1) - Barley + Linseed (ICMP-2)
S7: Dual purpose sorghum + Cowpea, F ( ICMP-1) - Chickpea + Mustard (ICMP-2)
S8: Sesame + Blackgram (ICMP-1) - Chickpea + Mustard (ICMP-2)
S9: Sesbania + Dual purpose sorghum + Guar, F (ICMP-1) - Wheat+Mustard (ICMP-2)
S10: Subabul + Sesame + Blackgram (ICMP-1) - Wheat + Mustard (ICMP-2)

**B) Management of intermittent dry spell (Sub-plot)**

I1: Without any intervention
I2: With interventions in *kharif* only

2. **Contingent Crop Planning Model-II**

**A) Efficient cropping system (Main plot)**

S1: Sorghum, F: Fodder - Chickpea (*Farmers practice*)
S2: Fallow - Mustard (*Farmers practice*)
S3: Bajra + Cowpea (F, ICMP-3) - Batra + Safflower (ICMP-2)
S4: Bajra + Greengram (F, ICMP-3) - Chinese cabbage, F + Safflower (ICMP-2)
S5: Sesbania + Bajra + Cowpea (F, ICMP-3) - Lentil + Linseed (ICMP-2)
S6: Subabul + Bajra + Greengram (F, ICMP-3) - Barley + Linseed (ICMP-2)
S7: Dual purpose bajra + Cowpea, F (ICMP-3) - Chickpea + Mustard (ICMP-2)
S8: Dual purpose bajra + Greengram, F (ICMP-3) - Chickpea + Mustard (ICMP-2)
S9: Sesbania + Dual purpose bajra + Cowpea, F (ICMP-3) - Wheat+Mustard (ICMP-2)
S10: Subabul+ Dual purpose bajra + Greengram, F (ICMP-3) - Wheat + Mustard (ICMP-2)
622  Progress of work-

6221 Achievements in terms of targets fixed for each activity:

<table>
<thead>
<tr>
<th>Target</th>
<th>Achievements</th>
</tr>
</thead>
</table>
| Layout, land preparation and execution of treatments | ✓ All the operations were done as per technical programme.  
✓ Due to the timely onset of monsoon during 2010, contingent crop planning module-I was tested in 10 fodder based efficient cropping systems.  
✓ All the interventions were executed as per technical programme. |
| Data recording on crop growth and agro-meteorological parameters | ✓ Data on growth of crop were taken.  
✓ Periodic data on agro-meteorological parameters was recoded |
| Sampling and recording of data on yield of component crops | ✓ Harvesting and recording of yield of various component crops was done. |
| Yield data analysis | ✓ Data was analyzed |
| Progress report | ✓ Under rainfed conditions of Bundelkhand, the total green fodder equivalent yield was higher in Subabul + Sesame + Green gram, F - Barley + Linseed (232.24q/ha) and Subabul + Sesame + Black gram-Wheat + Mustard (230.58 q/ha).  
✓ Adoption of intermittent dry spell management strategy (in situ weed mulching) recorded 10.93 percent higher green fodder equivalent yield than without management strategies (182.8 q/ha).  
✓ During rabi season only hedge rows of perennial components |
(soobabool and sesbania) thrives well. Water balance study reinforce that both moisture adequacy index (MAI) and soil moisture index (SMI) during the period October (40th to 44th SMW) ranged from 50.0 to 23.7 %, thus the rabi crops were not sown. However, the rabi crops were sown in the first week of January since two storms were occurred (13.4 and 26.4mm). Further, the subsequent weeks did not receive any rainfall and abrupt rise in maximum temperature from 19.5 to 33.8 °C causes no further growth of crops. Among crops sown after winter rainfall only barley and wheat gave little quantity of yield.

Table 1: Effect of integrated crop management package (ICMP) and intermittent dry spell management strategies on productivity of various component crops in different fodder based cropping systems.

<table>
<thead>
<tr>
<th>Treatments</th>
<th>Grain yield (q/ha)</th>
<th>Green fodder yield (q/ha)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Sorg hum</td>
<td>Sesame seeds</td>
</tr>
<tr>
<td>S1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S2</td>
<td>1.33</td>
<td>2.12</td>
</tr>
<tr>
<td>S3</td>
<td></td>
<td></td>
</tr>
<tr>
<td>S4</td>
<td>1.84</td>
<td></td>
</tr>
<tr>
<td>S5</td>
<td>29.53</td>
<td>143.04</td>
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<tr>
<td>S6</td>
<td>1.85</td>
<td>26.00</td>
</tr>
<tr>
<td>S7</td>
<td>4.87</td>
<td></td>
</tr>
<tr>
<td>S8</td>
<td>2.01</td>
<td>3.94</td>
</tr>
<tr>
<td>S9</td>
<td>4.70</td>
<td></td>
</tr>
<tr>
<td>S10</td>
<td>1.97</td>
<td>4.16</td>
</tr>
</tbody>
</table>

Efficient cropping systems

Interruption dry spell management strategies

<table>
<thead>
<tr>
<th></th>
<th>Grain yield (q/ha)</th>
<th>Green fodder yield (q/ha)</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I1</td>
<td></td>
<td></td>
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<td>I2</td>
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</tbody>
</table>
6222 Questions-Answered -

On the basis of two years study it was observed that with adoption introduction of perennial shrubs (subabool and sesbania) we can ensure the some fodder availability especially during rabi season under rainfed situations of semi-arid tropics.

6223 Process/Product/Technology/developed during the Year.

Efficient cropping planning and intermittent dry spell management strategies under aberrant weather situations.

6224 Utility of results obtained so far.

These results will be useful to mitigate the ill effects of climate change and ensure the fodder availability during lean period.

623 Publications and Material Development:

6231 Research Papers : none
6232 Popular articles : none
6233 Reports : none
6234 Seminars and workshops (relevant to the project) in which the Scientists have participated. :

No

6235 Infrastructure facilities developed:

No

PART –IV: PROJECT EXPENDITUTE
(SUMMARY)

YEAR

630 Recurring Expenditure:

6301 Salaries: (Designation with pay scale) (Rs. In lacs)
   i) Scientific
   ii) Technical
   iii) Supporting
   iv) Wages

6302 Consumables:
   i) Chemicals
ii) Glasswares

iii) Others

<table>
<thead>
<tr>
<th>Sub Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6303 Travel</td>
</tr>
<tr>
<td>6304 Miscellaneous</td>
</tr>
<tr>
<td>(other costs):</td>
</tr>
<tr>
<td>6305 Sub Total:</td>
</tr>
<tr>
<td>(Recurring)</td>
</tr>
</tbody>
</table>

| 631 Non-Recurring Expenditure: |
| As Proposed |

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<thead>
<tr>
<th>Equipments</th>
</tr>
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<tbody>
<tr>
<td>632 Total</td>
</tr>
<tr>
<td>(630 and 631)</td>
</tr>
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Signature of the Project Investigator

(Anoop Kumar Dixit)

(Suchit Kumar Rai)

(Mukesh Choudhary)

Signature & Comments of the Head of the Division

From the second year of findings it is clear that consecutive pattern has adversely affected effective moisture in soil for double cropping prospects under semi-arid situation of Thar. Consequent crop planning & management strategy may provide measure to address the issue from this study. (Signature)

Signature & Comments of the Director

[Signature]