

## ANNEX 1: Outputs and activities

### Output 1: Policy support to preparedness and contingency planning provided

Policy support to countries for the enhancement of their preparedness in facing emergency situations through advocacy, development of contingency plans and regional cooperation provided through the following activities:

#### 1.1 Conduct socio-economic and yield loss assessments in the countries affected by the disease or at direct risk

- Conduct socio-economic and yield loss assessments in Kenya, Ethiopia, the Sudan, Yemen and the Islamic Republic of Iran.
- Conduct socio-economic and disease risk assessment studies in the other countries of the Near East, Central and South Asia.
- Through these assessments, identify the most vulnerable farmers and communities
- Build and mainstream scaling-out approaches (linking with GIS wheat maps and superimposing pockets of poverty).
- Ensure linkage of results with contingency, development and research interventions to improve targeting and focus on most vulnerable segments.

#### 1.2 Carry out advocacy and awareness raising for policy-makers and the international community

- Hold regional and international meetings for high-level policy-makers and technical decision-makers to inform them on all aspects of Ug99 including its status, potential path of spread, availability of resistant varieties, and actions being taken at the international level, specifically by FAO and its partners within BGRI.
- Prepare for and distribute to the countries concerned awareness and information material addressed to different audiences and in various languages.

#### 1.3 Provide policy support to countries for the development and implementation of national contingency plans

- Organize national and regional meetings to assess country situations in terms of status of systems for surveillance and monitoring, seed

information, multiplication and distribution, breeding structures and needs, coordination and information exchange within the country and regionally, availability of national information on wheat growing areas, agro-ecological systems and agricultural landscapes, social vulnerability, and political and administrative structures.

- Organize national and regional meetings for the development of the most appropriate policy options and strategies and actions needed for risk reduction, disease prevention and control of wheat rusts, including strategies for the multiplication of quality basic seed of rust resistant varieties to replace rust susceptible varieties through both the public and private sector, and strategies for the establishment of long-term sustainable and effective surveillance and reporting systems.
- With national authorities, assess requirements for implementation of suggested contingency actions.
- Support countries in implementation of contingency plans through provision of capacity building, infrastructure development, regulatory support (registration of varieties and pesticides, etc.), and information and knowledge systems.
- When necessary, carry out required control operations in full collaboration with national authorities.
- Review and update contingency plans on the basis of the latest information on the status of wheat rusts from field surveys and global analysis.

#### **1.4 Provide support for regional coordination mechanisms**

- Provide policy support for regional cooperation as a support mechanism for national contingency planning.
- With the relevant policy-makers, develop mechanisms for networking and information and experience sharing at the regional and international levels.
- Organize regional and international policy-makers' meetings to assess and coordinate national contingency plans at the regional level, and exchange information and experiences.

## Output 2: Surveillance and early warning systems enhanced

In order to enhance the establishment of an effective and sustainable national surveillance system for wheat rust disease monitoring, including pathotyping and the establishment of a global early warning system to support decision-making for implementation of preventive actions and control operations, the following activities will be carried out:

### 2.1 Provision of policy and technical support for the establishment of effective and sustainable national surveillance teams

- Hold national and regional meetings to assess the national status of wheat field surveys (i.e. regularity, unit carrying out surveys, methodology, information sharing, responsibilities of various units and limitations and constraints).
- Technical and policy support provided to agree with national authorities on:
  - o the most appropriate structure for the establishment of sustainable and coordinated multi-institutional surveillance teams;
  - o the type and level of survey information to be officially shared and exchanged regionally and internationally;
  - o the national focal point(s) or way to ensure quality of national survey data and its transmission to concerned parties nationally and internationally; and
  - o the long-term surveillance programme and identification of lead institutions.
- Establish coordinated surveillance teams and obtain the nomination of a national focal point to coordinate national activities with FAO

### 2.2 Direct support to national wheat rust surveys and virulence monitoring through harmonizing surveillance protocols and strengthening national disease surveillance and pathotyping capacities

- Conduct regional workshops for harmonization of surveillance methodologies, survey work plans, national responsibilities and compilation of available information in wheat distribution maps.
- Agree the number and location of rust trap nurseries.

- Assess national surveillance material, infrastructure and human capacities.
- Provide necessary field survey support equipment, including global positioning systems, computers and printers and vehicles.
- Upgrade laboratories and greenhouses in key countries and equip them with the infrastructure and material necessary for pathogen characterization.
- Establish national rust trap nurseries in several key positions in each country and record the results.
- Train relevant national staff in field surveys pathotype analysis, including field rust trap nurseries.
- Direct support to undertake surveys.
- Support national focal points.

### **2.3 Support to regional interaction and information exchange**

31

- Organize national and regional workshops and field days in order to ensure continuous national and regional interaction.
- Create a FAO wheat rust surveillance website for enhancing public awareness and advocacy, updating the global situation of virulent wheat rusts in the field, and relevant scientific, regulatory and development information.
- Prepare awareness materials on the disease risks and status for distribution.

### **2.4 Establish a wheat rust early warning system at FAO**

- Establish a GIS system for incorporating national and regional wheat maps, national survey disease data and field trap nurseries information.
- Ensure the availability of updated meteorological data.
- Verify nationally developed maps.
- Incorporate available information on community vulnerability and socioeconomic surveys into maps.

- Establish a wheat rust early warning system using national field surveys, trap nursery data, national and regional wheat crop distribution patterns, and meteorological data.
- Predict occurrence and disease risk.
- Establish an information dissemination system to issue recommendations on disease status, alert levels and recommended actions for prevention and control addressed to relevant national, regional and international stakeholders and public awareness (i.e. website and bulletins).

**Output 3: National wheat varietal registration programmes for release of resistant varieties enhanced**

In order to strengthen national varietal registration programmes and international exchange of information and material in support of the development of durable rust resistant wheat varieties, the following activities will be carried out:

**3.1 Assess wheat rust disease resistance breeding capacities/varietal registration and areas for improvement of individual countries**

- Undertake baseline assessments on the current situation of wheat rust disease resistance breeding, varietal development and registration capacities in the countries concerned using available data from FAO's Global Initiative for Plant Breeding and the relevant IARCs, ICARDA and CIMMYT, and in close cooperation with national programmes.
- Organize national workshops to identify the support needed by countries in terms of capacity and institution building for national testing and release of rust resistant wheat varieties.

**3.2 Based on the assessment, provide technical support to countries in national multilocation adaptation and pest and disease resistance trials for rust resistant varieties**

- In close cooperation with ICARDA and CIMMYT and other leading advanced breeding institutes, provide the technical support needed in the area of breeding methodologies, varietal multilocation adaptation testing and disease resistance trials through study tours of IARCs and training.

- Provide the necessary equipment for varietal quality testing and harvesting field trials.

### **3.3 Based on the assessment, provide policy and technical support to national strategies and varietal release procedures**

- In close cooperation with ICARDA, CIMMYT and the International Treaty for Plant Genetic Resources for Food and Agriculture, organize national workshops to provide policy and technical support on the development of national strategies for varietal registration and the implementation of varietal release procedures, and on opportunities and limitations regarding the exchange of wheat resistant genetic material.
- Provide the technical training needed for the implementation of varietal release procedures.
- Support to the establishment of a database for released varieties including attributes of resistance to the new rust virulence.
- Prepare awareness material in the relevant languages on the procedures of varietal testing and release.

### **3.4 Provide policy support to countries for improving international cooperation in testing breeding material and information exchange**

- Provide policy, technical and financial support for establishing international and regional agreements and cooperation for testing national breeding material in international wheat rust nurseries (where a virulent pathogen is already present) and in sending infected wheat samples to advanced pathotyping laboratories (i.e. when facilities and capacities are not available nationally).
- Organize regional workshops for information exchange on the status of pathogen virulence, available resistant breeding material, and mechanisms for cooperation in the fields of material and information exchange.

## Output 4: Seed systems for quick multiplication and distribution of resistant varieties enhanced

In order to strengthen national seed systems for the quick multiplication and distribution of resistant replacement varieties, the below-mentioned activities will be carried out.

### 4.1 Work with national authorities to popularize adapted rust resistant varieties among farmers through seed campaigns, including field demonstration plots

- Organize demonstration plots in all wheat growing areas of each of the concerned countries to enable farmers to observe new varieties and learn about wheat rusts and better wheat production practices (it is assumed that because the entire production area will not be covered in the first year, new demo plots will be established each year to cover the whole country within 3–4 years).
- Organize training sessions for farmers at the demo plots on the assessment and evaluation of agronomic and quality characteristics of the new varieties.
- Organize training sessions for extension workers on the management of demonstration plots.
- Prepare awareness material on the characteristics of various resistant varieties and their field management.

### 4.2 Strengthen systems for early generation seed multiplication of rust resistant varieties in each country

- Where necessary, support countries through the training of technical staff in procedures for early generation seed production to minimize disease and maximize the yield for the quantity of seed provided.
- Provide countries with the equipment needed for early generation seed multiplication including production-related equipment, irrigation systems, seed cleaners, small scale equipment, and agricultural inputs.
- Support seed multiplication including the cost of water, labour, inputs and fuel.

- Wherever existing<sup>4</sup>, FAO Emergency Coordination Units will facilitate variety diffusion and seed exchange using FAO's extensive network and experience in strengthening local seed systems (experience has demonstrated that taking the local seed system as a starting point offers many opportunities for improving seed supply).

#### **4.3 With national authorities, develop and support a strategy for the multiplication and distribution of quality seed of rust resistant varieties to replace rust susceptible varieties through both the public and private sector**

- Organize workshops in support of the development of a national strategy for seed multiplication, distribution and varietal replacement (workshops are to be held at the district and national levels and should include participants from various concerned ministries and public boards, the private sector, farmers associations, and civil organizations directly or indirectly involved in the seed sector).
- Wherever Emergency Coordination Units exist, they will facilitate linkages between different seed systems and actors in order to overcome the weaknesses and optimize the strengths of both systems.
- Follow-up workshops should be also organized at the national and district levels for updating implementation of the strategy.

#### **4.4 Strengthen the National Seed Certification Agency's database through a national variety catalogue of released varieties and information on quantities of certified seeds available, including information on significant pests and diseases for each variety and their tolerance to these pests and diseases, in particular Ug99 rust strains**

- Organize a national workshop in preparation for the establishment/strengthening of the National Seed Certification Agency's seed inventory database.
- Provide the necessary hardware and software support for establishing/strengthening the seed database.
- Provide the necessary training for database management and updating.



## Output 5: Wheat rust management at the field level improved

In order to enhance the wheat field management practices of farmers through participatory methodology, the following activities will be carried out:

### **5.1 Reach agreement with the various national authorities on the establishment of participatory methods such as FFS to support wheat farmers in proper field management**

- Organize national workshops with concerned stakeholders to discuss and agree on:
  - o the participatory methods (FFSs or variations thereof) most adapted for the national extension system;
  - o the plan of work for the support of established farmer groups or FFSs, including the location and number of experimental sites, and training needed; and
  - o in countries where FFSs are already available, identify areas for their enhancement and their adaptation to the wheat crop.

### **5.2 Support to identified or established farmer groups or FFSs**

- Train selected extension agents in participatory methods and as facilitators, and in wheat production techniques.
- Where FFSs already exist and facilitators are already active, use training-of-trainers techniques to update them on wheat systems in particular.
- Organize national refreshers workshops for extension agents and facilitators to exchange field experiences and update their knowledge of participatory approaches.

### **5.3 Support to farmer groups through season-long participatory training**

- Establish experimental farmer sites/on-field trials for farmers' training or FFS when one or the other already present or is accepted as a participatory extension method.
- Train farmers over the whole season using participatory methods on wheat field management practices using agro-ecosystem

analysis, experimentation in local ecologies, and farmers' indigenous knowledge and experience (training will emphasize rusts, varietal selection and seed multiplication).

- Organize national and regional travelling workshops and field days to exchange field experiences.

#### **5.4 Develop training and reference wheat management guides for farmers and facilitators, based on local experiences**

- Produce reference guides and FFS training manuals on wheat production and protection to be used by FFS farmers and facilitators.

## ANNEX 2: Budget and outputs

BUDGET (USD)		
COMPONENT DESCRIPTION	TOTAL COST	%
Total cost in the countries (see next table for details)	54,941,746	74.4
Regional coordination (three units)	8,927,780	12.1
Global coordination	9,975,781	13.5
<b>Total</b>	<b>73,845,308</b>	<b>100</b>

Estimated cost per output and per country category based on the presence or risk of being affected by Ug99 (USD)

COUNTRIES <sup>2</sup>	OUTPUTS <sup>1</sup>					TOTAL	%
	1	2	3	4	5		
Countries already affected	686,441	1,897,536	558,060	3,247,492	5,021,234	11,410,764	21
Countries at immediate risk	589,500	1,773,741	465,050	2,637,032	3,777,388	9,242,712	17
Countries at high risk	1,592,961	4,581,728	1,302,141	6,221,195	9,857,758	23,555,783	43
Countries at risk	400,860	1,173,761	372,040	1,606,061	1,862,821	5,415,544	10
Other countries	350,332	1,010,011	288,996	1,469,119	2,198,486	5,316,943	10
TOTAL	3,620,094	10,436,778	2,986,288	15,180,900	22,717,686	54,941,746	100
%	6.6	19	5.4	27.6	41.3	100	

### 1) Outputs

Output 1: Policy support to preparedness and contingency planning provided

Output 2: Surveillance and early warning systems enhanced

Output 3: National wheat varietal registration programmes for release of resistant varieties enhanced

Output 4: Seed systems for quick multiplication and distribution of resistant varieties enhanced

Output 5: Wheat rust management at the field level improved

### 2) Country categories

Already affected: Ethiopia, Iran (Islamic Republic of), Kenya, Sudan, Uganda, Yemen

At immediate risk: Afghanistan, Eritrea, Iraq, Oman, Pakistan

At high risk: Armenia, Azerbaijan, Egypt, Georgia, India, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Syrian Arab Republic, Tajikistan, Turkey, Turkmenistan, Uzbekistan

At risk: Algeria, Libyan Arab Jamahiriya, Morocco, Tunisia

Other: Miscellaneous to be determined based on disease development

## ANNEX 3: Work plan

Calendar of activities by component and category of country

Countries / Activities	Already affected *				At immediate risk *				At high risk *				At risk *			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Output 1 - Policy support to preparedness and contingency planning</b>																
1.1 Socio-economic and yield loss assessments in the countries affected by the disease or at direct risk																
1.2 Advocacy and awareness raising for policy-makers and the international community																
1.3 Policy support to countries for the development and implementation of national contingency plans																
1.4 Policy support in regional coordination mechanisms																
<b>Output 2 – Enhancement of surveillance and early warning systems</b>																
2.1 Policy and technical support for the establishment of effective and sustainable national surveillance teams																
2.2 Support to national wheat rust surveys and virulence monitoring																
2.3 Support to regional interaction and information exchange																
<b>Output 3 - National wheat rust disease resistance breeding/variety development programmes for release of resistant varieties</b>																
3.1 Assess wheat rust disease resistance breeding capacities/variety development and areas for improvement of individual countries																
3.2 Technical support to countries in national multilocation adaptation and pest and disease resistance trials																
3.3 Policy and technical support to national strategies and variety release procedures																
3.4 Policy support to countries for improving international cooperation in testing breeding material and information exchange																

Countries / Activities	Already affected *				At immediate risk *				At high risk *				At risk *			
	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
<b>Output 4 - Seed systems for quick multiplication and distribution of resistant varieties enhanced</b>																
4.1 Popularize adapted rust resistant varieties among farmers through seed campaigns, including field demonstration plots																
4.2 Strengthen systems for early generation seed multiplication of rust resistant varieties in each country																
4.3 Support a strategy for multiplication and distribution of quality seed of rust resistant varieties to replace rust susceptible varieties																
4.4 Strengthen the database of the National Seed Certification Agency for seed inventories																
<b>Output 5 - Wheat rust management at the field level improved</b>																
5.1 Agree with the various national authorities on the establishment of participatory methods for proper field management																
5.2 Support to identified or established farmer groups/FFS																
5.3 Support to farmers" groups through season-long participatory training																
5.4 Develop training and reference wheat management guides for farmers and facilitators																

Countries already affected: Ethiopia, Iran (Islamic Republic of), Kenya, Sudan, Uganda, Yemen

Countries at immediate risk: Afghanistan, Eritrea, Iraq, Oman, Pakistan

Countries at high risk: Armenia, Azerbaijan, Egypt, Georgia, India, Jordan, Kazakhstan, Kyrgyzstan, Lebanon, Syrian Arab Republic, Tajikistan, Turkey, Turkmenistan, Uzbekistan

Countries at risk: Algeria, Libyan Arab Jamahiriya, Morocco, Tunisia

Other countries: Miscellaneous to be determined based on disease development

## ANNEX 4: Logical framework

Objective	Verifiable indicators	Means of verification	Assumptions
<p>Contribute to reduction of the world's vulnerability to emerging wheat rust diseases, and facilitate the evolution of a sustainable international system to reduce the risk and contain the threat of wheat rusts and continue the enhancements in productivity required to withstand future global threats to wheat.</p>	<p>Current yield losses due to stem wheat rust reduced Cereal rust monitoring and early warning systems developed National contingency plans developed and action taken Small farmers provided with replacement seeds of Ug99 resistant varieties International and regional cooperation and information exchange enhanced</p>	<p>FAO reports Reports of BGRl partners (ICARDA, CIMMYT and Cornell University) Reports from national systems Policy-makers' meeting reports Website on wheat rusts</p>	<p>National authorities cooperate and agree on disease surveillance and sharing information Availability of funds</p>

Purpose	Verifiable indicators	Means of verification	Assumptions
<p>Prevent rust epidemics in wheat producing countries through the strengthening of national seed systems, improved surveillance, monitoring and preparedness, and proper field management.</p>	<p>Surveillance systems in place and functional in concerned countries</p> <p>Contingency plans reflecting a change in wheat cultivation policy in place in concerned countries</p> <p>Pathotyping facilities and capacities upgraded and functional in directly affected countries</p> <p>Seeds of resistant varieties multiplied and distributed to small farmers in countries affected by or at direct risk from Ug99</p> <p>Wheat rust monitoring system in place at FAO, alert bulletins issued and awareness material distributed</p>	<p>FAO reports</p> <p>Reports of BGRl partners (ICARDA, CIMMYT and Cornell University)</p> <p>National agricultural research reports</p> <p>Alerts bulletins issued</p> <p>Rust website developed with situation reports on regional rust distribution</p>	<p>Governments cooperate in disease surveillance and information sharing</p> <p>Availability of resistant varieties</p> <p>Availability of funds</p>

Outputs	Verifiable indicators	Means of verification	Assumptions
1. Policy support to preparedness and contingency planning	<p>Contingency plans reflecting a change in the wheat cultivation policy in place in at least 6 countries</p> <p>Action taken by at least 3 countries for the implementation of the contingency plans</p> <p>Socio-economic / impact assessment conducted</p>	<p>FAO, and other BGRI partners' reports</p> <p>Reports from national systems</p> <p>Socio-economic / impact assessment report</p> <p>Policy meeting / workshops proceedings</p>	<p>Governments willing to commit to national and regional coordination and information sharing</p> <p>Availability of funds</p>
2. Enhancement of surveillance and early warning systems	<p>Harmonized surveillance systems established</p> <p>Surveillance teams in at least 10 countries established, trained and equipped</p> <p>At least 40 persons trained in pathotyping</p> <p>Wheat rust surveys conducted</p> <p>Pathotyping facilities (laboratories and greenhouses) and staff trained in at least 6 countries upgraded and functional</p> <p>Wheat rust monitoring system in place at FAO</p> <p>Coordination and early warning systems established</p> <p>Wheat rust website established at FAO</p> <p>Alert bulletins issued and awareness material distributed</p>	<p>National surveillance reports</p> <p>Trap nursery reports</p> <p>Training reports</p> <p>Wheat rust website</p> <p>Alert bulletins issued</p> <p>Awareness material</p> <p>FAO and other BGRI partners'</p>	<p>Cooperation of Governments in information sharing and support to national surveillance</p> <p>Availability of funds</p>



Outputs	Verifiable indicators	Means of verification	Assumptions
3. National wheat rust disease resistance breeding/variety development programmes for release of resistant varieties	<p>Efficient varieties registration system in place in at least 6 countries</p> <p>Trainings in variety data base management and implementation of varietal release procedures undertaken</p> <p>Databases for released varieties including attributes of resistance to the new rust virulence established in at least 6 countries</p> <p>National and regional workshops undertaken to improve exchange of information and genetic material</p>	<p>FAO, and other BGRI partners' reports</p> <p>Reports from national systems</p> <p>Published awareness material on the procedures of varietal testing and release</p> <p>Reports from the workshops and meetings</p>	<p>Government ready to cooperate in improving varietal registration regulations and in information sharing</p> <p>Availability of funds</p>
4. Seed systems for quick multiplication and distribution of resistant varieties enhanced	<p>Resistant varieties identified and basic material increased</p> <p>Seeds multiplied by various stakeholders</p> <p>Major seed producers (public, private or farmers) in the country trained</p> <p>Seeds from resistant varieties distributed to small farmers in at least 6 countries affected by Ug99 or at direct risk</p>	<p>FAO, and other BGRI partners' reports</p> <p>Reports from national systems indicating the varieties and quantities multiplied</p> <p>Training reports</p> <p>List of farmers receiving seeds of resistant varieties</p>	<p>Availability of wheat varieties with still undefeated rust resistant genes</p> <p>Varietal registration system in place in the concerned countries for quick adoption of the varieties</p> <p>Availability of funds</p>
5. Wheat rust management at the field level improved	<p>At least 5 pilot sites for participatory training established in each country</p> <p>At least 35 facilitators identified and trained</p> <p>At least 35 Farmers Field Schools (FFS) established and running in the countries affected by Ug99 or at direct risk</p> <p>At least 1000 farmers trained countries affected by Ug99 or at direct risk</p>	<p>Meetings reports</p> <p>Training of Trainers reports</p> <p>Lists of farmers and FFS registered and receiving support</p> <p>FFS curricula developed</p>	<p>Identification of proper sites and facilitators</p> <p>Agreement of the Governments to release facilitators</p> <p>Availability of funds</p>

## **The FAO Wheat Rust Disease Global Programme**

*will provide support to reduce the world's vulnerability  
and protect the livelihoods of the billion people who are at risk.*

*The programme has been developed under the auspices  
of the FAO Crisis Management Centre for the Food Chain.*

[www.fao.org](http://www.fao.org)