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WARDA'S RESPONSE TO THE REPORT OF THE INTER-CENTER RICE REVIEW

WARDA's Board and Management commend the Inter-Center Rice Review (ICRR) Panel for accepting this important assignment for the TAC and the CGIAR, and we welcome this opportunity to respond to the conclusions and recommendations contained in their final report.

WARDA recognizes the scale and complexity of the Panel's task. We are particularly aware of the limitations in arriving at sound, long-term conclusions, especially as the Panel itself has defined certain key areas of investigation as being outside of their scope of work. These include, among others: issues related to the optimum level of total CGIAR resources allocated to rice research; the shares of CGIAR resources allocated to rice and other commodities, both globally and within Africa; and consideration of the efficiency of operations within respective centers. WARDA is also aware of and sympathizes with the difficulties faced by the Panel to complete its work in a relatively short period and with access to what has in many instances been insufficient information.

Having stated this, we acknowledge that the Panel has attempted to make an objective economic analysis of the issues, and has presented its findings with clarity.

The main conclusions and recommendations of the Panel's report are: (1) CGIAR rice research in sub-Saharan Africa is overfunded relative to Asia; (2) funds must be reallocated from Africa to Asia to redress this imbalance; (3) WARDA cannot continue to operate as an independent commodity-based center for a relatively small region; and (4) new institutional arrangements are necessary to ensure an effective use of CGIAR core funding for rice research in West Africa.

We believe that these recommendations are so fundamental and far reaching that they should only be endorsed by the TAC and accepted by the CGIAR if the underlying information and analyses are demonstrably sound and entirely credible, and if the broader implications are fully understood, weighed and found to be fully justified. We regret that these conditions have not been met in the present report.

Findings (1) and (2) are the result of efficiency analyses employing simple congruence analyses and rate of return methods. Those analyses, however, are incomplete, and the conclusions are weakened by information gaps that led the Panel to make crucial but highly questionable assumptions. In other instances data referred to in the report are out of date. In its attempt to comply with its global terms of reference, the Panel's conclusions are further weakened by their analyses of emerging rice research agenda for Africa and Asia, as if rice crop cultures were nearly identical in the two regions. We submit that there are fundamental differences that must be recognized. Finally, findings (3) and (4) are subjective judgments with inadequate basis in fact.

WARDA's submission to the TAC can be summarized under three broad issues as follows:

1. Incomplete Congruence Analysis

The report finds that CGIAR core funds are overallocated to sub-Saharan Africa (relative to Asia) by a factor of about 17 when compared with current regional differences in value and volume of rice production, and by a factor of approximately 7 when compared to the regional distribution of projected increases in demand for rice by the year 2030. It draws these conclusions from simple comparisons of regional indexes of research intensity.

1.1 Exclusion of Modifiers

Efficiency criteria require that regional intensity indexes should be equal in order that marginal returns to research investment are equated regionally and thus net returns maximized globally. In reality, however, the report acknowledges that "there is absolutely no presumption that the intensity of research funding according to these measures should necessarily be uniform" across all regions (page 23).

The report lists several factors as legitimate sources of disparity. It is important to note that if applied, most of these factors would favor a greater allocation of resources to sub-Saharan Africa: heterogeneity of cropping systems (significantly greater in Africa), environmental impacts (more severe in Africa due to the importance of upland rice systems), the extent of research spillover (more limited in Africa thus requiring greater decentralization of technology development effort within Africa), levels of past funding (much greater in Asia thus justifying greater current investment in Africa), and prospects of success (uncertain in impact).

The report does not attempt to quantify the possible impacts of these (or other) "modifiers", nor to introduce them in any way into their congruence analysis. By doing so the report assumes that there is but one objective of relevance in agricultural research priority setting: economic efficiency. We believe that this is too partial an approach to guide the allocation of public international resources. We note that the TAC in its priority setting exercise communicated strong admonitions as to the limitations of this approach. The TAC found simple efficiency congruence analysis alone to be unsatisfactory, and insisted on the application of a range of modifiers to incorporate other important objectives in order to determine more broadly defined optimum system-wide resource allocations. That the Panel has not done so significantly weakens its conclusions.

1.2 Exclusion of NARS Research Expenditures

A second and more serious problem is that research intensity comparisons are based on levels of CGIAR core resources only. Consideration of all global resources expended in rice research for developing countries must be included if the type of marginal returns' analysis employed in the report is to be valid. While it is true that the TAC and the CGIAR are only responsible for ensuring the most efficient allocation of CGIAR funds, the returns to these funds are directly affected by the levels of expenditures from other sources.

Failure to include all research investments risks two errors. First, exclusion of other resources leads to an overestimate of returns to CGIAR expenditures alone (due to the very reasonable assumption of diminishing marginal returns to aggregate global investment

employed by the Panel in defining its research production function). Second, the share of research impact or returns attributable to CGIAR resources are also systematically overestimated. In regions where non-CGIAR resources are substantial, excluding them from an efficiency-based congruence analysis can seriously bias, and even reverse, the outcome.

The report indicates that the CGIAR's annual expenditure of \$39 million represents only 6% of the allocation to rice research in developing countries. It also acknowledges wide regional disparities between the strengths of national rice research systems. It states that "China, India and Brazil have considerable scientific strengths" (page 9), with advanced capacity in basic, strategic as well as applied research. They could have added the Koreas, Taiwan, Indonesia and Thailand as well which contribute significantly to Asian rice science. In contrast, most sub-Saharan African NARS are small, resource-poor, limited to mostly adaptive research, and facing increasingly tight budget constraints. The report recognizes the limited capacity of African NARS, observing that investment in agricultural research is declining most particularly in sub-Saharan Africa and Latin America.

Although the report presents a crude breakdown of non-CGIAR expenditures in developing countries (suggesting that \$585 million is spent annually by NARS, \$16 million by France, plus \$10 million misc.) it inexplicably fails to provide any information as to the regional distribution of these other expenditures. Given the disproportionately large share of non-CGIAR expenditures, it is crucial that this information be integrated into the analyses.

The implications of this exclusion can be easily demonstrated. We start by estimating how non-CGIAR investments in rice research are distributed between Africa and Asia.

- A survey conducted by WARDA in 1990 found that there were 95 full-time equivalent rice scientists with BSc or higher qualifications in West Africa. (Only 19 full-time rice scientists had PhD degrees.) Using information from ISNAR we have estimated an average total expenditure of \$35,000 per agricultural scientist in Africa. Assuming expenditures per scientist are equal across commodities, we can estimate the total expenditure on rice research by **West African NARS** as **\$3.33 million** (95 X \$35,000). This shows that the total expenditure on rice research among West African NARS amounted to only 52% of WARDA's core budget in 1993 (\$6.4 million).
- Lacking similar data for ECSA, we assume that the level of expenditure by NARS in **ECSA** is roughly one third of the level in West Africa, or **\$1.1 million**. We can also assume that expenditures on rice research in **WANA** are one half that in all of sub-Saharan Africa (that is, in rough proportion to their relative production shares), or **\$2.21 million**.
- Data from ISNAR show that in 1976, research expenditures on rice in Latin America were approximately equal to that in sub-Saharan Africa. We assume that growth has been more rapid in **Latin America** and is now three times greater than the level in Africa, i.e **\$13.3 million**.

Using these figures we can estimate the total NARS expenditure on rice research in **Asia** as a residual value. This yields **\$565 million** (585 less 3.33 less 1.1 less 2.21 less 13.3).

This is 22 times greater than IRRI's total expenditure in Asia. In other words, IRRI's core budget represents less than 5% of the total rice research investment in Asia, suggesting that Asian rice farmers have significant alternative sources of technology in addition to IRRI.

Next, we assume that as French institutions are working in some 15 countries in Europe, Africa, Asia and Latin America, one third of their total expenditure of \$16 million is directed to sub-Saharan Africa, i.e \$5.33 million, with equal amounts directed to research in Asia and Latin America. Finally, we assume that the remaining \$10 million (misc.) is distributed in proportion to regional production levels; that is, \$9.4 million to Asia and \$0.2 million to sub-Saharan Africa.

These figures suggest that total non-CGIAR expenditures on rice research in Asia are \$579.7 million compared to \$9.8 million in sub-Saharan Africa, a 59 fold difference. Adding CGIAR expenditures provided in Table A.2 of the Panel's report we can see that **the total investment in rice research in Asia is \$605.5 million vs \$18.2 million in sub-Saharan Africa, a difference of 33 times.**

When research intensity indexes are recalculated on the basis of these more complete global expenditures on rice research in developing countries, the results change significantly from those presented in the Panel's report. Table I below shows indexes calculated for both non-CGIAR expenditures and total expenditures. Because the Panel report underlines the importance of demand trends in making resource allocation decisions, we have calculated intensity indexes both on rice consumption and production. Finally, indexes are calculated for two points in time, the most recent figures used in the report, and for the year 2000 using FAO projections. For this analysis we have used the core base envelopes set by the TAC for the year 1998; that is, \$25.8 million for IRRI and \$5.8 million for WARDA (the same share of IRRI's budget is allocated to ECSA as in Table A.2 of the Panel's report).

The results show that non-CGIAR investment is disproportionately low in Africa, both with respect to production and consumption, and in both time frames. When CGIAR resources are added the production indexes suggest overinvestment in sub-Saharan Africa using 1986/88 output data. By the year 2000, however, the disparity is greatly narrowed due to the more rapid growth of rice production in Africa.

In contrast, indexes calculated on the basis of regional consumption levels in 1987/89 suggest a slight aggregate underinvestment in Africa relative to Asia. By the year 2000, this disparity widens considerably suggesting the need to shift substantial resources into sub-Saharan Africa. These results reflect the much more rapid growth of rice consumption in Africa as compared to Asia.

The inclusion of all global resources in an expanded analysis also draws into question the report's analysis of the levels of CGIAR core investment necessary to equate rates of return across regions (Tables 3.3 and B.3). In particular, the shares of impact attributable to the CGIAR (assumed in the report, without any supporting evidence or argument, to be 25% in Asia and either 25% or 50% in sub-Saharan Africa) are grossly out of line with their respective shares of total expenditure. Even if we assume that CGIAR funds are 50% more effective than those employed by other research entities, this would suggest that the shares of

impact would be less than 8% in Asia, but greater than 65% in Africa. Using these more realistic coefficients, the results of those analyses contained in the report are also reversed.

Table I. Intensity indexes calculated on production and consumption for investments in rice research for Asia and sub-Saharan Africa.
(US cents/ton of unmilled rice)

Investment Source	Basis	Year	Asia	SSA
Non-CGIAR	Production	1986/88	1.34	1.31
		2000	1.04	0.78
	Consumption	1987/89	1.35	0.80
		2000	1.08	0.50
Total	Production	1986/88	1.39	2.24
		2000	1.08	1.34
	Consumption	1987/89	1.40	1.37
		2000	1.12	0.86

Two questions can be raised about our revised analytical approach. First, are the regional research expenditure figures valid? We can only reply that they are based wherever possible on the data used in the report itself. It would have been preferable if the Panel had collected these data themselves (as implied in their second term of reference) and had incorporated them into more comprehensive analyses. Clearly, this needs to be done before final and credible recommendations concerning the need to reallocate resources between regions can be formulated.

Second, should the CGIAR legitimately fill the enormous research and technology generation gap left by small, resource poor national programs in Africa? Our answer is that the international centers in fact did this successfully in Asia more than 20 years ago. In discussing the role of the CGIAR, the report acknowledges that the CGIAR "fills gaps which could be filled by national systems, but which currently lack attention; it provides a bridge to advanced institutions, active in basic and strategic research" (page 19). This is precisely the dual role defined by WARDA in its Strategy and Medium-Term Plans.

2. Growth in Rice Demand and the Distribution of the World's Poor

2.1 Rice Demand Trends

The report estimates that between 1986/88 and the year 2030, rice production in developing countries will need to more than double, increasing from 464 million tons to 1,000 million tons to meet expected demand. The report projects that more than 90% of that

additional demand will be in Asia and less than 4% in sub-Saharan Africa. A closer comparative look at these figures, aided with historical hindsight, puts the regional challenges into much needed perspective.

We must note first that Asia is a major surplus producer of rice and is expected to remain so into at least the beginning of the next century. FAO data show net exports of 5.5 million tons in 1987/89. FAO analysts project net exports from Asia to grow at roughly 4.6% annually through the end of this century, exceeding 9.3 million tons by the year 2000. FAO also projects closing stocks in Asia to grow at a rate of more than 2.4% annually throughout this decade, reaching a level of 52.2 million tons by the year 2000.

Table 3.4 of the Panel's report projects that Asian demand for rice will grow at an annual rate of 2.4% between 1987 to 2005, and 1.3% between the year 2006 and 2030. This means that Asian demand will increase over the entire 43 year period at an average annual growth rate of only 1.8%. This low rate of growth reflects declining per capita rice consumption as well as falling rates of demographic growth.

In stark contrast to the Asian situation, sub-Saharan Africa is a major importer of rice, with FAO data showing that imports accounted for 30% of the continent's rice consumption in 1987/89. During that same period 3.8 million tons of raw rice equivalent were imported annually at a yearly cost of \$696 million in scarce foreign exchange (using the report's price assumption of \$284/ton of milled rice). FAO analysts project that imports will continue to grow throughout this decade at 4% annually, surpassing 6.1 million tons by the year 2000.

Underlying these trends is the explosive demand for rice in sub-Saharan Africa. The Panel's report projects African demand for rice to grow at an annual rate of 5% between 1987 and 2005, and at 2% per year from 2006 until 2030. (We believe that the assumed reduction in growth to only 2% per year is unrealistically low for the latter period, and unsupported by probable values for the underlying determinants of rice demand. A figure of 2.5-3% is more reasonable. Clarification from the Panel as to the source of their low projection is needed.) Using the report's low estimate, the demand for rice in sub-Saharan Africa will increase over the period by 294%, representing an average annual growth rate of 3.2% through the year 2030.

Comparing future demand projections with past growth performance (presented in Table 1.3 of the Panel's report) strongly suggests that the major challenge to global research on rice is not in Asia but in Africa:

The 1.8% projected rate of growth in Asian rice demand has been exceeded by that region's production growth for each decade since 1950. During the periods 1950-1965, 1965-1980, and 1980-1989 Asian rice production grew at 2.2%, 2.9% and 2.7%, respectively. Growth in Asian rice yields alone (excluding area expansion) has substantially exceeded future demand growth since 1965. Moreover, yields show an increasing trend rising from 1.1% during the first period, to 2% and 2.5% during 1965-1980 and 1980-1989, respectively. These positive trends clearly reflect the success of past CGIAR investments in rice research in Asia, but they also reflect the rapidly increasing strength of Asian national programs such as that in China. It is equally clear that comparing these trends with future rice requirements does not reflect an impending imbalance in Asia.

A very different picture emerges in sub-Saharan Africa. Production growth in Africa has been below projected demand increases for most of the last 45 years. The report shows that production growth rates for the three periods (1950-1965, 1965-1980, and 1980-1989) were 1.7%, 3.2% and 3.0%, respectively. Moreover, important growth shares were from area expansion (0.9%, 2.8% and 1.3%), a source of growth which is becoming environmentally unsustainable in large parts of Africa. Posing the greatest challenge to future research is the urgent need to sustainably intensify production and increase African rice yields which rose during the three periods at rates of only 1.7%, 0.4% and 1.7%, respectively.

2.2 Regional Patterns of Poverty

The mission of the CGIAR is not only to increase food production, but to do so in a manner that improves the wellbeing of poor producers and consumers. That is, an appropriate balance must be found between efficiency and equity objectives in determining the allocation of CGIAR resources.

The Panel's report summarizes data on the regional distribution of the world's poor in Table 1.4. It concludes that these data suggest an underinvestment of overall CGIAR resources in Asia, and point toward reduced priority for sub-Saharan Africa. This conclusion must be challenged because there are at least two problems with the data on which it is based: they are out of date and static.

The World Bank's World Development Report 1992 provides updated figures of the absolute numbers and shares of population in poverty in 1985 and 1990. It also projects figures for the year 2000. A rapidly changing shift in poverty from Asia to sub-Saharan Africa is clear.

Between 1985 and 2000, the number of Asians below the poverty line is projected to decline at an annual rate of 0.3% in South Asia and 5.5% in East Asia. In contrast, the number of African poor is projected to increase 3.4% annually over the same period. Whereas in 1985, 67% of the poor in all developing countries were living in Asia, World Bank figures show that by the year 2000 this is expected to decline to 53%. At the same time, Africa's share of the developing world's poor will grow significantly, increasing from 17% to 27%.

It is very important to note that if we extrapolate these trends forward, the Bank's figures suggest that by the year 2015, less than one generation away, more than a half billion Africans will be living in poverty. During that same year the extrapolation shows that the absolute number of Africans in poverty will exceed the number of poor Asians. An equally staggering figure reported by the World Bank is that by the year 2000 49.7% of all sub-Saharan Africans will be living in poverty. This will compare with 36.9% in South Asia and only 4.2% in East Asia.

The direction of these trends, particularly when viewed against the relatively dynamic economies of Asia and the stagnant economies of sub-Saharan Africa, underlines the enormity of the challenge facing the international community in agricultural research and development directed at Africa.

Not all poor Africans produce rice, of course, but a rapidly growing share are dependent on rice as their major source of low cost calories. Studies by IFPRI in several West African cities have shown that rice is no longer a luxury food but has become a principle energy source for the urban poor. They found that the poorest third of urban households obtain larger shares of their cereal-based calories from rice than do higher income households, and rice purchases absorb a much greater share of their total cash expenditures. In short, rice availability and rice prices have become major determinants of the welfare of the poorest West African consumers who are least food secure. As the numbers of Africa's poor increase, the strategic role of rice will increase in tandem.

Rice is also critically important to a special risk group among Africa's rural poor: women farmers. In many areas of Africa, rice is produced primarily by female farmers and generates an important share of their incomes. Research has shown that female incomes tend to benefit children and other vulnerable groups more than do the incomes of men.

The Panel of WARDA's External Program and Management Review (EPMR) has argued that "the case for an international research program on rice in West Africa is overwhelming", and calls for increased levels of support for such research. We believe that the evidence put forward in this response is consistent with that argument, and serves to correct the incomplete analyses contained ICRR report.

3. WARDA's Viability and Institutional Options

3.1 Viability and Resource Requirements

WARDA has considerable difficulty in accepting the conclusion of the Panel that "a fully functional rice commodity institution could only be maintained if the budget were increased by approximately 25% above current levels" (page 41). We acknowledge that a significant increase in support would be required for WARDA to conduct a fully diversified program of research directed at all the major constraints to rice production in West Africa.

However, by defining strict research priorities, by focusing our resources on activities which we can do best and which have the highest probability of near-term impact, and by collaborating selectively with advanced research institutions and with our NARS partners, WARDA's research programs are functioning efficiently and effectively. This was confirmed by WARDA's recent EPMR.

The EPMR Panel observed that WARDA is "very well managed, with a program that is soundly designed and (which) holds out the prospect of a significant impact in a reasonable time horizon"; that "it has assembled...high-quality team of scientists" and "has developed exceptionally good mechanisms for working with national systems". We believe that these are the fundamental components of institutional viability.

We concur with the EPMR Panel that an additional allocation of resources to WARDA would enable it to have even greater impact, and that such resources would be fully justified and efficiently utilized. The proposals contained in WARDA's Medium-Term Plan for the period 1994-1998 detail how these resources would be utilized, and provide realistic measures of near-term impact. Those proposals set out a balanced program of resource and crop

management research, and varietal improvement research, within a clearly defined ecoregional context.

3.2 Alternative Institutional Arrangements

The EPMP Panel explicitly examined institutional alternatives to WARDA, including operating WARDA as part of another center. It concluded that the losses in program focus and efficiency would significantly outweigh the minor economies that might be achieved. Our analysis agrees with that finding. We are particularly concerned that the privileged relationships which WARDA has developed with, and the strong support it receives from, its national partners would be lost.

Having said that, we believe that there are important and as yet untapped opportunities for closer collaboration with other CGIAR centers as well as with other advanced research institutions. Cooperation with IITA and IRRI is of particularly high priority. Our Medium-Term Plan sets out collaborative activities with both centers in several key areas of resource and crop management research and genetic improvement. For example, WARDA and IITA are currently developing a major research consortium involving a range of international and regional partners focused on inland valleys. Closer collaboration in training and publications also needs to be developed with the goal of achieving significant efficiencies for all three centers.

We are proud of the progress we have made, and the recognition we have received, implementing new mechanisms for partnership with national programs. WARDA's new Medium-Term Plan expands this approach into a broader "open center" concept. We are convinced that this is an efficient means of providing even greater leverage to limited CGIAR core funds. We are also convinced that this is a cost effective way of reducing duplication and fully exploiting the skills and resources of national programs within an integrated and complementary regional research program.

Within this context, we must question the findings of the ICRR report that IRRI is best suited to provide research services to Eastern and Southern Africa. That the report makes this statement in the framework of an integrated WARDA/IITA arrangement, and given its admonition that limited CGIAR funds be applied in the most effective way possible, is even more surprising. We can conceive of no technical, institutional or economic arguments that could support preference for leadership in rice research in that part of Africa to be provided by an Asian-based rather than an African-based research institution.

We also strongly disagree with the implication of the ICRR report that support to weak national programs inevitably creates long-term dependency. Rather we see our partnership activities as a means of building NARS capacity to permit national programs to become more effective in meeting national goals and, at the same time, more self-reliant and thus less dependent on direct technical assistance.

4. Conclusions

We submit that the main conclusions and recommendations of the Panel's report as they relate to (i) overfunding of CGIAR rice research in sub-Saharan Africa, (ii) reallocation of funds from Africa to Asia, and (iii) new institutional arrangements, cannot be fully justified. Arguments put forward in the report must be questioned on the basis of (i) the exclusion of non-efficiency objectives from the congruence analysis, (ii) the exclusion of crucial and relevant NARS data showing their comparative levels of expenditure, strengths in strategic research and contributions in Asia and Africa, and (iii) inadequate interpretation of data concerning growth in rice demand and the global distribution of poverty.

The evidence and arguments put forward in this response to the ICRR Panel report, combined with the conclusions of WARDA's EP MR, provide strong justification for the proposals set out in WARDA's second Medium-Term Plan. As the EP MR report concluded, there is an overwhelming case for a CGIAR rice research program in West Africa, and a clear and a clear need to further strengthen WARDA to enable it to meet its increasingly urgent task.