EGYPT–JAPAN TECHNICAL COOPERATION

RICE MECHANIZATION PILOT PROJECT IN ARAB REPUBLIC OF EGYPT

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JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)

PREFACE

The Rice Mechanization Pilot Project was inaugurated in 1981 as a bilateral cooperation program supported by the governments of the Arab Republic of Egypt and Japan. The Project aims to establish an appropriate mechanical farming system for rice production by introducing technical innvations at the sites of rice production along the Nile Delta in Egypt.

The first phase of the project, up to 1986, was a successful demonstration of the effectiveness of mechanized cultivation technologies as modified and applied to existing conditions in Egypt. Through diverse efforts in the whole course of project implementation, cadres of agronomists, engineers, and field technicians with sufficient technical expertise were created and prepared for future practical engagements.

The current phase of the projects, which extends to 1990, aims to bring further refinement and thoroughness to technology transfer and to expand the area of application to five outreaching sites located throughtout the Delta. The research and development side will concentrate on gauging the technical feasibility of direct seeding cultivation practices as an alternative economic way of increasing productivity.

A new perspective for development of human resources to be deployed for dissemination of general mechanization is emerging by enchancing programmes for training personnel in extension.

This report tries to summarize the results of various efforts made by the project's Egyptian staff working in copperation with the Japanese experts throughout the season of 1987. Personal names indentified with report items indicate only who assumed the ultimate responsibility for execution and orderly reconding of the processes and their arrangements into final reports. It should be stressed that a whole organization of people contributed to realizing these achievements, ranging from those who sat behind the wheel of a tractor puddling paddy fields in kafr El Sheikh, to those working in offices in Cairo or Tokyo. Therefore, this report has been preparedas a sort of dedication to commemorate the efforts of everyone who participated in the project in any way.

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O V E R V I E W

The general framework of whole activities of the project was laid out in the annual operational work plan which was formally discussed and adopted in the Joint Committee meeting held in February 1987 at Agricultural Mechanization Research Institute, Cairo. The meeting was chaired by Professor Dr. Ahmed F. El-Sahrigi, the project director, attended by concerned officials of the Agricultural Research Center, project's Japanese experts, and J I C A officials.

At the same meeting, the overall project agenda for the current phase were formally agreed upon. Taking note of the final evaluation of the achievements of the previous phase, the main areas of project activities were selected and defined as in the following three items.

1. *Further research to furnish technical bases for the establishment of cultural practices for realizing stable as well as high yielding rice crops.*
2. *Expanding the area of application of the already verified mechanized rice production system by newly establishing five local demonstration units on a practical operational scale.*
3. *Exploration of alternative labour saving technologies like those incorporating direct sowing methods practised in mechanization context.*

Structural plan of major research programmes is seen in the flow diagram shown on a separate sheet.

There is an implication that, by being involved in the implementation process, the general level of professional expertise of the project staff will be upgraded through inevitable opportunities for learning necessary skills and know-hows. Through further discussions and examinations of incidental problems before going into actions, more detailed versions of activity schedules for the season were finalized.

During this preparatory discussions, there emerged a strong argument that, in the area of research, especially for the subjects concerned with agronomical factors, such as planting densities or fertilization methods, operational means should be restricted to full scale mechanization equipment. Efforts were made to reconcile this argument with the practical considerations for actual engagements in field trials with precise requirements for variables.

It should be emphasized that long term plannings and the coordination of efforts by people of different interests and responsibilities are essential to run successfully the kind of huge operation in which we are being involved. The advance preparation for procurement of needed machinery, seedstocks, chemicals, etc. was advised and , in order to effect it timely, efforts were made to follow due procedures conforming to the statutory requirements of both governments. At least one year of lead time is required for the timely furnishing of a huge set of machinery and chemicals unavailable on local markets. Some chemicals, such as hydroxyisasol (TACHIGAREN ACE) and BENLATE-T, both of which are indispensable for securing sound and uniform seedling growth in nursery, had to be put on an urgent order to be delivered by air cargo travelling from Far East to Middle East.

Areawise, the scale of project activities occupies approximately 330 feddans(138.6 hectare) of paddies entirely devoted to mostly machinery transplanted rice, scattered over the sites comprising one center and five satellite farms located at different spots in the Delta. Field experiments were conducted on minor portion of the Center farm. The rest of the entire area was cultivated as the general production fields, serving simultaneously as the demonstration or show-case fields for displaying and verifying the modified standard mechanized production system to the neighbouring rice growing communities.

SATELLITE OBJECTIVES

Each satellite field was put to the operation by the technology package which had been verified for its feasibility under natural conditions prevailing in Qallin or Meet El Dyba Center during the project's preceding phase. The current phase is to test and extend the package with incidental modifications adapted to constraints specific to each applied area.

FEATURES OF PACKAGE IN THEORY

As being well recognized, the principal features of the technology package we are trying to display consist of a rigorous adherence of operational practices according to specifically prescribed cultural standards, which are to ensure the materialization of ideal growth characteristics associated with a high-yielding rice crop. Specified items include, a qualified planting density, ideal nutrient regime, or the ecological requirements for the most effective weed control, etc. Physical environmental conditions required in our package are to be created by appropriate application of tillage technology.

The uniform and level paddy topography lying on homogeneous tilth aggregates of consistency suitable for mechanical manipulation is the primary target of our soil preparation work. The seedling trays with uniform stand distribution and vigorous and healthy seedling growth are essential for carrying out a trouble-free and successful transplanting operation by machinery.

ACTUAL APPLICATION AND CONSTRAINTS

When the prescriptions for ideal plant growth were put to real tests with the scale we implemented in actual operations, we were forced to become aware of the existence of multitude of constraints which would cause distortions to the desired results.

Constraints experienced and identified through activities this year are of either natural, or institutional, or structural, or mostly complicated origins. Since the whole scheme presupposes the deployments of combinations of all factors for production, ranging from land, water, materials, to labour, a comprehensive planning and effective management of affairs is the essential feature of our enterprise. Efforts were made to procure land and allocate matériels to each site with good timings.

An enormous amount of jobs involved can be imagined just by thinking of going through the whole bureaucratic process of newly bringing under control the totally 250 feddans (105 ha) of land which is a government property all right but under the jurisprudence of another branch of the government and scattered on five separate locations.

We also have to appreciate the whole amount of labour requirement for preparing and looking after of more than 33,000 of well tended seedling trays which our enterprise had to deal with in a single season.

IMPORTANCE OF GOOD SOIL PREPARATION OR LEVELLING

More amount of time should have been made available for land preparation so that more thorough levelling of paddy surface was carried out.

The tolerance for unevenness of paddy surface is smaller with our technical package. Unlike the traditional system, the length of seedlings is shorter, mostly less than 15 cm at 2.5 leaf-age, vs. 30 cm at 6 to 8 leaf-stage, necessitating the maintenance of levelness of finished surface within an allowable limit, preferably less than 5 cm for the elevation difference between the highest spot and the lowest portion. Primary surface leveling should be done by some grading or planing implements rather elaborately before flooding the field for puddling and finishing. Major elevation differences can be corrected only by operating relatively heavy earth moving equipment before flooding. After inundation, the tractor trafficability decreases, and the reduced draft makes it all but impractical to carry out a significant earth moving and smoothing job. The main objective of soil preparation work after flooding should be restricted to minor and localized smoothing and surface finishing.

Incidentally, the peculiar property of the Delta soil facilitates softening and disintegration of clods after flooding. The cohesive forces that bind together soil particles forming clod structures, which resembles concrete in hardness, apparently are nullified by solvent action of water which easily permeates the soil structures formed through preceding desiccation. This unique characteristic of the Delta soil simplifies the puddling operation, in which the mere smoothing operation by trailing a floating wooden horizontal bar or board suffices the purpose. This simpler method was found out to be superior to a more mechanized operation by power driven rotary puddling equipment, because the latter tended to create a planting bed too soft in consistency, owing to the action of the machine which pulverized soil too finely, inconveniencing the ensuing transplanting operation.

EFFECTS CAUSED BY POOR LEVELLING

The failure of securing suitable paddy topography presents a series of problems to our technical system in a very specific and causal way.
The seedlings planted on a higher ground have more chances of being exposed to the elements and kept dry, making the survival and normal settlement of newly transplanted seedlings difficult. Such a high portion of the field tends to suffer from the concentration of salts, resulting in salinity injuries to the crop plants. The younger is the leaf-age, the more susceptible is the seedling to saline conditions, a negative factor for the infant seedling system. The injury is aggravated by occasional cut-offs of the irrigation water. Most types of herbicides currently on the recommendation list require submergence after application for a minimum period of duration(3 days or more). Therefore, the herbicides effects would likely be less than anticipated on higher grounds, causing more weeds infestation and reduced yields.

IRRIGATION WATER INSUFFICIENCY

Water shortages were also a critical constraint factor. They occurred as a result of inconvenient water allocation schedules controlled by local irrigation offices. Shortages also arose when the pumps broke down unexpectedly, without being supplemented by emergency pumps of sufficient capacities. Structural deficiency, i.e., the lack of adequate water distributing ditch system within our fields, also made it impossible to irrigate each of field patches most conveniently according to the progress of the planting schedules, resulting in the difficulty in controlling the soil consistency by arranging the sequence of puddling operation.

Insufficiency of irrigation water caused delays in work schedule, leading to the unfavourable situation of having to plant already overgrown, physiologically unhealthy seedlings. It should be remembered that the following of an exact sequence of successive farm operations is another nucleus of our technology system. Every maneuver has its best timing, in relation to others which precede or succeed it. The aberration from the recommended norm inevitably results in poor or less efficient performance in obtaining the desired effects. The herbicide Satan has to be applied around 8 days after transplanting, of course together with good water management, if we want to realize the best weed controlling effect out of this input.

Farmers often complain and make a false accusation about the mechanically transplanted rice, that it is susceptible to weed infestation because the seedlings are too small and the row spacing is too wide (actually it is only 30 cm and the rice plant has the enough capacity of vegetatively increasing its occupying area by tillering.) The farmers' complaint only attests the importance of exactly following the standard prescription in various cultural operations. The farmers' situation very likely arose from his failure in preparing well levelled paddies, followed by proper water management and herbicide application at a right timing.

TRANSPORTATION INFRASTRUCTURE

The facilities for ready and fast transportation are almost an indispensable prerequisite for our technology package which takes it for granted that smooth flow of matériels is always available for supplying the continuous needs of mobile field working equipment.

Our nursery beds for raising seedlings are always set up at a certain location within the field where the access to water and daily inspection and caring is readily available. At the time of transplanting, the seedlings grown in plastic trays, each one of which weighs about 8 kilograms, have to be transported somehow to the field patch where they are finally loaded on to transplanting machinery. Since there is no respectable branch road system trafficable by any type of carriage vehicles, the conveyance of all the seedling trays, from the nursery to the carriage trailer and then from the point of unloading off the trailer at the nearest field entrance on the farm road to the plot of actual operation, had to be completed by bare human hands.

Crowds of school children were employed extensively for the purpose. The total tonnage of seedling trays thus conveyed was estimated at 264 tons for all project. For each 50 feddans(21 ha) of field block, surrounded by farm roads trafficable by tractor drawn vehicles, but without feeding branch road system, the total distance needed to be travelled by labourers carrying seedling trays was estimated at 525 kilometers, a distance more than that of a round trip between Alexandria and Cairo, an arduous task, indeed!

This numerical estimation revealed and confirmed the actual experience of a paradoxical situation in which the amount of labour needed for transporting seedling trays was almost equivalent to that which will complete the same area of transplanting by the traditional manual procedures. The traditional system arranges the location of nursery beds lying in narrow strips alongside the field plots, minimizing the requirement for transportation, the situation our system cannot emulate for some other reasons not described here.

Because of the intensity and intricacy of the job which requires careful handling of delicately nursed young plants but has to be carried out under difficult circumstances, seedling trays very often are abused, receiving less than adequate attention and care, resulting in the destruction of seedling quality before they reach the destination.

The constraint here, therefore, can be said to have arisen from the lack of adequate road systems which otherwise will facilitate the ready access to each plot of paddy field by machinery and supplies.

An argument has a case in stating that the sacrifice of land surface to be expended for the road construction can be justified and will be more than made up for by the boosted yield to be realized from the reduced area, which becomes possible by the improvement in all production procedures on account of improved accessibility of the land.

Our case may be likened to that which involves the modern industrialized economy, where the means of transportation and communication play an indispensable role in increasing the productivity of the society as a whole. In other words, the current constraint is a structural one, awaiting for solutions by corresponding measures similar to the ones calling for the investment of social capitals.

OTHER CONSTRAINTS

We also experienced classical cases of natural constraints, such as, soil salinity, weeds (*hasheeshi),* diseases, insects, and birds, etc..

The salinity problem was more serious at the sites situated near the sea. It was complicated further by the fact that at these sites, the irrigation water more often than not had to be lifted from the drainage canals containing brackish water. Besides, the water level of drainage canals sometimes went up too high to maintain enough head for effecting salt leaching by surface run-off method. The shortages of enough fresh water conceivably constituted a major cause of the problems encountered in these areas. The adoption of a salinity tolerant variety presented a solution to a certain extent, to be sure, but the results were not so conclusive as having been expected. The ultimate solution may have to be sought in the fundamental amelioration of the soil by installing effective drainage facilities, followed by sufficient leaching. In the meantime, efforts are being made to improvise palliative measures like gypsum application, changes of fertilizer dosages, the adoption of the intermediate-age seedling, the installation of localized drainage facilities, etc..

WEED PESTS

If one look at the weed problem casually, one may classify it as one of the constraints affecting adversely the process of crop production, asserting its own right as a constraint. One may think it in terms of the same category as other biological factors, e.g., diseases and insect pests. Conventional flow of thoughts reasons and induces, " Because of weed growth, the crop yield was reduced so and so percents." There are classical scientific experiments to substantiate this theorem-like statement. Our actual experiences with a large scale practical cultivation indicate the validity of the reversed reasoning, that is, "Because of the yield reduction, weed growth was rampant."

Corollary : due to a high crop yield, weed infestation was negligible.

In other words, *the weed problem is not the cause of a poor crop, but it is the result of the latter.* Infestation of diseases and insect pests definitely reduces the yield all right, but flourishes as their host crops prosper. A lean harvest starves sparrows and field mice.

Ecological mechanisms behind these contrasting phenomena can be explained by the difference in relationships between the crop and the kind of pests.

The relationship between the crop and the weed is primarily competition, while the crop-disease, or crop-insect relationships are parasitism and predatory. Our primary aim in crop cultivation should be to grow a good crop population. The good weed control will mostly result from good crop management. Establishing a good crop population is a necessary and sufficient condition for the effective weed control, while the latter is only a necessary one for the former. The measures which ensure good crop growth, like successful planting of sound and healthy seedlings with the optimum population density and distribution, followed by adequate water management and herbicide application, are the best strategy for the effective weed control. This concept is enhanced by the present state of herbicides technology which makes the complete annihilation of weeds almost a realistic objective, at least, as far as the annual weeds are concerned. The plots where at harvest time the weed growth dominated the crop, reducing the yield to barely a handful of grains, were invariably those where the transplanting process was not successfully carried out for some reason or other.

The rice itself is unique among field crops, for it is the only one which is transplanted as in the case of intensively cared horticultural crops. One of the main objectives of resorting to this extra laborious practice is to give an ecological advantage to the crop vis-à-vis other weed species competing for the dominance in the same living sphere. The relative advantage increases as the age of transplanted crop plant advances. Therefore, those bigger seedlings used in the traditional system have definitely higher competitiveness against weed population. If at a reduced degree, our infant seedling system still retains enough competitiveness to be able to suppress the weed growth by dint of the timely application of herbicides. This is made possible by the fact that infant seedlings develop resistance to herbicide action by the time of application, and the kind of selective(acting discriminately against weeds) herbicides can now kill the weeds without harming the crop plants. All these facts indicate that, in theory at least, the infant seedling system can claim the same competitive advantage as the adult seedling system as long as the former is employed in conjunction with unfailed application of adequate growth management practices.

The recognition of above described ecological principles confirmed through this season's experiences will provide an insight for organizing our future activities.

RESEARCH FOR ALTERNATIVE TECHNOLOGIES

Emphases in the research area for the present phase were laid mainly on the efforts for assessing the technical feasibility of the cultivation systems based on direct seeding method, simultaneously ascertaining the technical prerequisites for it. Input and control factors, such as, varieties, fertilization schemes, weed control measures, water management, soil preparation technologies, etc. are the main items for investigation.

Shematic flows of principal programmes
for the research and development. RMPP 1986-90.

I. Feasibilities assessment of mechanized direct seeding cultivation.

Reconnaissance of technical elements and their verification.

Seedbed preparation and paddy topography improvement technologies.
Assessment of varietal characteristics relevant to mechanized procedures.
Utilization of seeding equipment under dry or wet condition.
Determination of optimum seeding density for dry or wet condition.
Determination of optimum nutrients supplementation schemes.
Strategy assessment for effective weed control technologies.
Optimization of water management schemes.
Growth-regulating substances utilization, what & how.

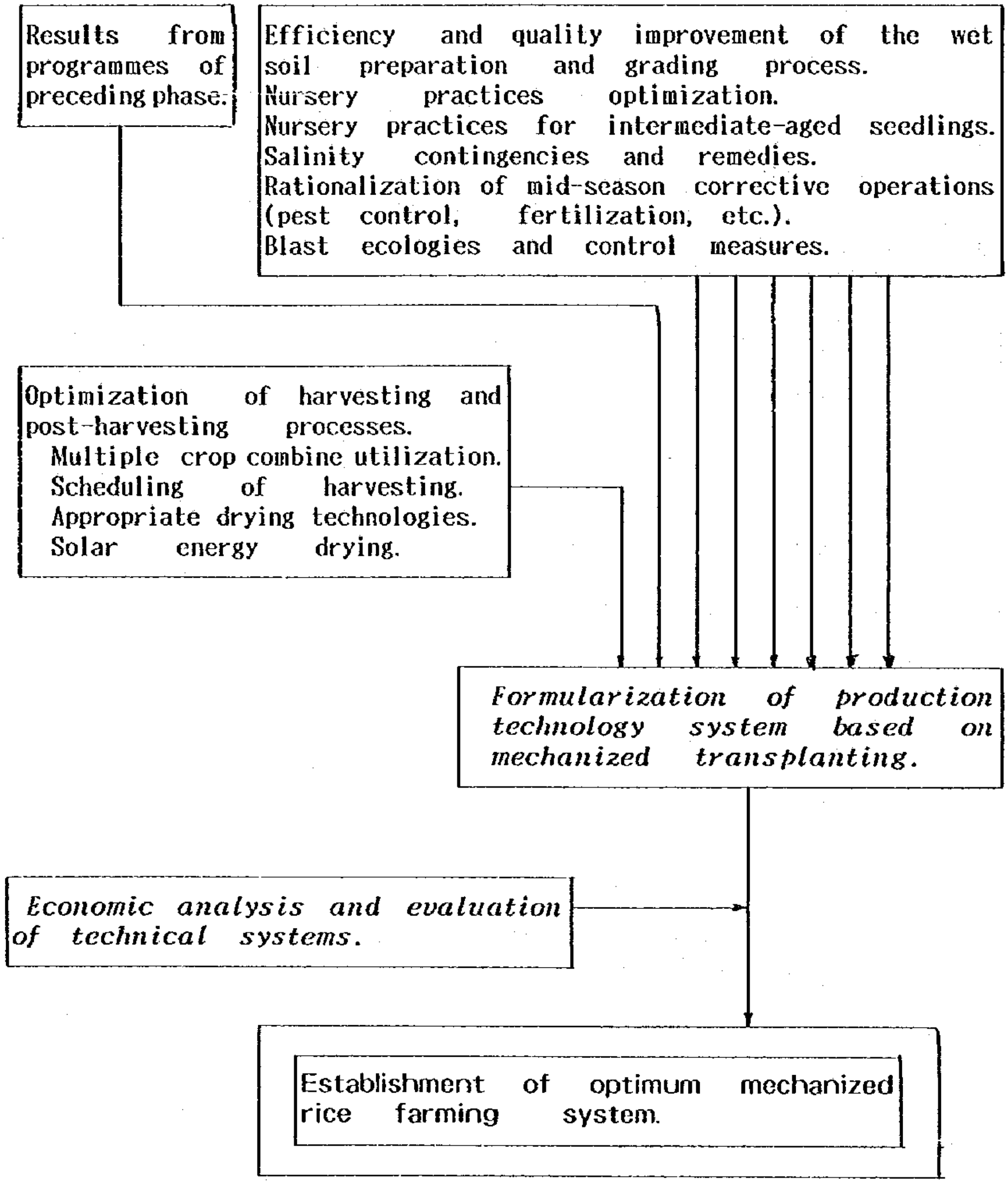
Scale verification of production procedures by dry-land seeding system.

Scale verification of production procedures by wet-land seeding system.

Economic analysis and evaluation of technical systems for their feasibilities.

Formularization of production technology system based on direct seeding.

II. Improvement of technical elements in the production system based on mechanized transplanting.



WET-LAND & DRY-LAND SYSTEMS

Two alternative modes of direct seeding practice, i.e., wet-land seeding and dry-land seeding, were simultaneously put to investigation.

If we compare the two, wet-land seeding system is a relatively well established practice among actual farmers. Live examples are extensively found in some localities, as in the area lying along the Damietta highway between Mansoura and Mahalla el Kubra. The governorates of El Fayoum and Kafr El Sheikh are also known for some areas where this method is preferred by farmers to the conventional transplanting.

In principle, the technical system, as it is practised by local farmers, can be considered as merely the extension and modification of ordinary nursery practices for raising seedlings for traditional planting. Sowing is done mostly by manual broadcasting, with occasional cases of space-leaving hill planting, of course, by adroit fingertips.

Advocates for this method cite the economy and simple procedures involved as the reasons for their adoption. Our surveys confirmed these claimed advantages. There, however, seem to exist certain particular conditions favouring the inclination to this method. We have found that coincidences of factors make farmers select this method over the alternatives, somehow enabling them to realize the desired ends. The labour situations nowadays are getting tight anyway everywhere, and especially in those areas where other manufacturing industries flourish, attracting working force with better wages without seasonal lay-offs. Facilities assuring continuous availability of water, such as the proximity to the major canals, may give the farmer the liberty to choose the convenient timings for soil preparation and sowing operations on a broader area which needs more amount of flooding water than in the case of nursery preparation which occupies only about one eighth of the total area. A cropping system that allows early clearing of winter crops also enables the early enough starting of direct seeded rice, securing a full length of growing season. A relatively small scale of operation seems to induce farmers to resort to direct seeding, because the very scale may not justify a major scale mobilization of production resources such as hired labours or machinery. For arranging those hiring services, advance planning and coordination with other people is necessary anyway irrespective of the size of operation. The farmer would rather do planting by himself, if he can, than go through all the troubles of negotiating with the conflicting interests of other people in order to get ready what he needs.

The availability of reliable weed control technology is also a major factor allowing direct seeding to be less plagued with weed infestation.

Without effective herbicides, weeds present a decisive obstacle to direct seeded rice which has to compete with weeds from the very beginning of growth, which condition the transplanted rice can usually evade to the advantage. The alternative recourse is the meticulous care of removing weeds by bare hands in the middle of growing season, which is possible only in small scale operation.

The above analysis of the various conditions found in the direct seeding, as it is practised by actual farmers, clearly describes its present state that it is essentially applied to specialized small scale operation where the needs for genuine mechanization do not necessarily exist.

If we look at the problem, a major question is the fact that we do not have any practical powered machine to perform planting on wet-land condition. This makes it necessary for us to devise a certain practicable mechanization means before we can apply this method to the situation where mechanization is really called for to solve the labour shortage problem.

DRY-LAND DIRECT SEEDING

Compared to the wet-land system , the dry-land system has a definite advantage over the other when we want to mechanize the whole process. Large type and heavy machinery can be utilized to the full efficiency with ease up to the stage of sowing, and possibly up to pre-emergence treatments. However, owing to the difficulty in obtaining finely pulverized seed-bed because of the peculiar soil texture found in the Nile Delta, the resulting stand establishment is unpredictable and insecure, which is condemning the dry-land system still to remain to be an experimental mode of rice cultivation even in the manual domains.

We are trying to find some breakthrough technologies to overcome the impasse, mainly in the area of tillage for seedbed preparation, and also in the method of seed treatment and subsequent water management.

An enlightenment was obtained for the possibility of controlling the variation of seed settlement depths by modifying the diameters of coated seed spheres. Unlike the situation found under rain-fed conditions where the moisture needed for germination is supplied by intermittent rainfalls for an extended period, the directly seeded rice in the Delta has to obtain the needed moisture solely from the irrigation water. It calls for, at least, temporary flooding of seeded field to effect the soil moisture situation suited for germination.

Inundation proceeds horizontally from the water inlet to downstream. The process is rather a drastic one altering the germination environment for better or worse, depending on where a seed happens to be lodged in the soil mass. It is generally believed and observed that the water impregnation of the structural matrix consisting of soil clods, seeds, and air leads to the disintegration of the clod structure, and that the seeds which have fallen and been suspended in the inter-clod spaces are now released and resettled to new locations within the restructured, more densely packed seed-bed matrix. Subsequent draining is a necessary step to ensure the supply of oxygen to buried seeds. The moisture control of dry-land seeding is a delicate art and there exist the needs for further accumulation of practical as well as theoretical data until enough amount of information become available for practical application.

The situation is complicated owing to the incidence of scorching sunlight prevailing in the desert climate which accelerates the desiccation of a few millimeters of seedbed surface to form crust structure, preventing sprouting seeds from penetration, while the lower layers remain soggy and suffocating to germinating seeds.

Our experiment has revealed an interesting finding that unsoaked seeds showed better emergence rates than the soaked ones.

A series of elaborately designed experiments clarified the relationship between the clod size distribution and the distribution of seed settlement depth after flooding the soil on which seeds had been broadcasted. More seeds were found at deeper layers as the clod size became larger.

This demonstrated the importance of preparing seedbed in such a way as to reduce the clod sizes to finer fractions as much as possible. It is generally believed that, in order to obtain a good germination, more than 60 percents by weight of seedbed soil should be composed of the fraction of soil clods less than 2 cm in diameter. This standard seems to be a target rather difficult to achieve under our conditions in the Delta.

We have to make compromise with the existing condition and find the next best solution to the problem.

The germination behaviour of relocated seeds after flooding is a subject worthy of further research to be challenged in succeeding seasons.

Theoretical rationales will be clarified for establishing requirements for the seedbed preparation operation.

With the state of the art of tillage and sowing, the requirement that seeds should be placed uniformly at a certain prescribed depth seems all but impossible to be met. With all the large clods in seedbed, the adjustments for controlling the depth of seed placement by existing drilling equipment simply do not work as they are designed to perform.

An idea has emerged out of casual observations in the fields. The soil on the neighboring farm where the land had been under cultivation of upland crops in the past looked quite friable and responded to mechanical impacts with ready pulverization, the condition amenable to normal drilling work. Similar conditions were also observed on the field which were plowed in autumn after harvesting the previous rice crop. The surface soil seemed to have undergone the process of disintegration as a result of natural cycles of wetting and drying during the winter when a substantial amount of rain fall can be expected in the Lower Nile Delta.

If we are able to make use of this natural weathering action for assisting the clods pulverization, the seedbed preparation work will become much simpler and facilitated for the regular drilling equipment to be exploited without its function being reduced to an awkward item of mere seed distributor. To promote the development in this direction, some basic research work should be organized for the purpose of clarifying the dynamic process of consistency changes of the target soil as a function of the moisture changes, simulated to the natural as well as artificial, i.e., irrigated conditions.

OTHER RESEARCH RESULTS

Various input and control factors have been clarified as to the selection of alternative measures and levels in the practical applications.

A certain combination of coating substances showed some promise worthy of further investigation to search for practical way of accelerating the early growth of directly seeded rice.

Herbicide selections and application schemes were tested for direct seeding cultivation, for both dry-land and wet-lannd systems. Information was gained and some promising combinations were found for wet-land system.

Exact identification of the situation of our adversaries is the first step for winning the battle. Weed problems are no exception to this axiom.

Efforts were exerted to correctly identify the weed species found to be increasingly obnoxious to our paddy fields. A completely new set of perennial weed species were found to be gaining dominance in Meet El Dyba fields, i.e., Diplachne Fusca, Paspalum paspaloides, Scirpus tuberosus, and Cyperus esculentus. These species seem to be on the point of going on the rampage, favoured by the continuous mechanized cultivation of rice.

An all year round control measure was suggested, including chemical applications in a special way, and the outright mechanical removal, which is feasible and effective since the major mode of propagation of these weeds is vegetative and numbers are comparatively few and manageable.

NEW TRANSPLANTING TECHNOLOGY

1.ADOLESCENT SEEDLING SYSTEM

Intermediate-aged seedling system was suggested as a measure to cope with the growth retardation afflicting the infant seedlings(20 days) transplanted on saline soils. Inevitable prolonging of the nursery period (30-40) necessitates extra care in nursery management, so that seedlings are provided with sufficient amount of nutrients to sustain the progressive growth for a longer period within the area of limited dimension of growing media, i.e., seedling tray. Fertilizers have to be added scrupulously to the soil within the tray as well as to the underlying bed soil. Where the soil salinity is a major constraint, the introduction of intermediate-aged seedling system will constitute a viable solution for extending the application of the mechanized practice.

However, one must be prepared to accept the cost increases in labour and materials inputs incidental to this system. One has to raise a larger number of seedling trays, possibly amounting up to 150 per feddan, instead of less than 100 with the ordinary infant seedling system. The cost mark-up is conceivably justified and offset by the expected higher return realizable by better crops with the improved tolerance to salinity.

2. BROADCASTED SEEDLING SYSTEM

An attempt for the simplification of existing mechanized transplanting system was made in the trial of seedling-broadcasting system. This practice became to be known by the nickname " parashot," an Arabic parlance for " parachute ", among our project members, because of its association with the aviation equipment that helps one descend through the air, to which the free falling seedling blocks, solid bases with fluffy tops, have an apparent similarity. Its significance as a way of executing an important item of farm work is the possibility of minimizing the machinery cost while retaining the major portion of advantageous characteristics of transplanting method. If one looks at this method from another viewpoint, one would be able to say that this is more directly the way for simplifying the traditional transplanting than a variation from the mechanized version.

The idea was inspired by a type of transplanter using a special kind of seedling box(Kabumaki-pot ; hill planting pot), developed especially for raising more advance-aged seedlings in colder climates. Seeds are sown to separately partitioned taper-shaped soil cubes or cylinders arranged in a tray. The main objective is to get the least degree of injuries to seedlings in the process of their separation from the soil magazine and then feeding to the device for planting and depositing onto the ground.

The equipment unit itself, currently available commercially, is quite effective as it is applied in the situation to which it has been originally developed. However, the cost increase is substantial because of the size of outlay for the needed equipment. Our intended system extracts and uses only a portion of the whole system, in which seedling blocks are broadcasted by simple human hands. Instead of the mechanical procedure for placement of seedling blocks, we intend to broadcast them by hands, over the puddled field as in direct seeding.
Efforts for development are called for to devise a means of obtaining separate seedling blocks of appropriate size for single hills.
We conducted an experiment with the so-called Dapog method developed in the Philippines for somewhat different purpose. It was verified that seedlings sound enough for our purpose could be obtained through this method. Further research is needed to develop a device to prepare seedlings into separate hill blocks. A prototype model has been designed and proposed.

BLAST DISEASE CONTROL

Blast disease has become one of the major constraints in rice cultivation in Egypt. Because the recognition of this pathogene as a threat is a relatively recent phenomenon, there exists only a scanty amount of practical knowledge about ecological characteristics or behaviour under the Delta conditions.
Unfortunately, the epidemic of this disease in 1984 coincided with the intense drive for and the spread of mechanized transplanting. The disastrous year was further complicated by the widely spread cultivation of REIHO variety which was susceptible to a common strain of blast pathogen. All this apparently has created a peculiar situation that many farmers have become erroneously convinced that the rice plant grown by mechanized transplanting are subject to the blast infection. This biased belief is, at best, only circumstantial, and, of course, scientifically groundless, but seems to have settled in the minds of many farmers and even with some of the people in the rank of agricultural research and extension, creating a somewhat difficult atmosphere for the dissemination of mechanization. Our task is to clarify the exact ecological circumstances and to verify the effective means for controlling this disease.

RACE IDENTIFICATION and CHEMICAL CONTROL

Identification of inhabitant races was conducted by the inoculation method using the seedlings of 9 differential varieties exposed to the

spores separated from the lesions found on leaves collected from the rice plants on different locations in the Delta. A variety was identified which was found immune to virulence of any strains of blast disease inhabiting the Delta paddies.
As to the control measures by chemical application, all kinds of chemicals tested showed effectiveness against leaf blast, while one type of fungicide demonstrated a marked advantage over others in controlling panicle blast.

SALINITY DAMAGE CONTROL

Comparison between different types of underground drainage facility showed a distinct yield increase by enhancing the capacity for percolation of soil, using a layer of paddy husks as the porosity maintaining structure around the perforated pipe facility.
Gypsum application was found to be effective for the alkaline soil. The effect for the sodic soil was inconclusive. The intermediate-aged seedling showed definitely better growth after transplanting. Adoption of the system incorporating more advance-aged seedlings is highly recommended for the use on the soil perpetually afflicted with alkalinity or salinity. Care must be taken in organizing the whole system of operation since the amount of input factors increases. Appropriate considerations should be given to the inevitable increase in demand for materials and labour in preparation and handling of a larger number of seedling trays.

HARVESTING AND DRYING

The importance of the choice of timing in harvesting was reconfirmed with the study of preharvest changes of grain variables specific to the varieties which had recently come into general or experimentally recommended cultivation.
The duration of ten days upon the completion of maturity was found to be optimum period for harvesting in order to maximize the yield as well as to minimize the loss accountable by panicle shattering or grain cracking.
A series of shallow bed drying tests clarified some points for the performance improvement of solar grain dryer. With the current setup of equipment, the loading capacity was demonstrated to be increasable up to 4 tons per batch without reducing the drying rates of any portion of the entire grain bed.

MECHANIZATION OF DIRECT SEEDING ON A PRACTICAL SCALE

Comprehensive trials on a practical scale were instituted to verify a viable mechanized version of direct seeding system. Unstable germination of the used seedstock prevented us from getting conclusive results out of current experiments. However, a number of facts have emerged, forming a technical base for our future efforts.

The wet-land direct seeding was shown to be mostly manageable, assured of a stable growth and yield, whereas the alternative dry-land system tended to result in poor germination and uncertain stand establishment.

Laser assisted land grading derived better smoothed seedbed. However, repeated application of the laser year after year seemed not to justify the cost increase, because the degree of levelness obtained by the process did not increase to the degree commensurate with the replicated operations.

The advantage of the laser equipment utilization obviously should be sought in its application to a larger patch of target field, possibly exceeding 2 feddans or more with more coarse topography, the situation in needs of further investigation.

Comparative trial cultivation revealed the definite advantage in labor saving effect by direct seeding system. A finding was made that a relatively large amount of labour is required for preparation and transportation of seedling trays or boxes in case of mechanical transplanting and seedling broadcasting systems. Yield differences among systems were not conclusive.

ECONOMIC EVALUATION

Attesting and vindicating the contention that the mechanization indeed can pay for itself and assure profits to farmers has been of vital concern of the project agenda and several analytical studies have demonstrated clearly the advantages of mechanized rice cultivation over the traditional system. This year's economic analysis took up the position of actual farmers who were supposed to mechanize their operations by ordering services from machinery hiring agencies.

Armed with the methodology of operations research and linear programming, and assuming economically rational responses by individual farmers to the available mechanization technologies which are to be offered by hiring agencies with the fixed rates for specific jobs, the analyses have derived a set of price levels of charged custom operations which are acceptable from the viewpoint of farmers who intend to maximize the profit out of their improved operations. With the prices level and other conditions as they stood in the spring of 1987, the analysis concluded that the hiring charge for transplanting operation should stay lower than L.E. 25 per

feddan, and that for combine harvesting L.E. 85 , so that the mechanized rice is to be chosen among the combinations of other crops or the traditional method. The lowest yield level that can justify the mechanization was found to be around 3 tons per feddan.
The study also reexamined and identified several socio-economic or structural constraints facing the dissemination of mechanized rice cultivation system.

DEMONSTRATIVE CULTIVATION

A major portion of the experimental fields of the Rice Mechanization Center was devoted to the actual production enterprise. The cultivation employed a modified standard system of mechanized operations, starting by transplanting infant seedlings, growing two varieties, I R 28 and Giza 171. Improvements were sought, firstly in planting bed preparation, i.e., deeper soil, smoother surface but coarser textured tilth, and secondly, in intentional increase of planting density, to secure a larger number of grains per unit area, which, if managed properly, is considered to be the primary factor contributing to high yields.
At the harvest time, the target average yield of 3 tons per feddan(7.14 tons per hectare) was surpassed with a margin, topping the previous year's record by 20 percents. The yield figure of this range is remarkable considering the adverse soil conditions(saline marshy soil) and the structural situation prone to water shortages.

The show window cultivation at five satellite farms produced results, the contents of which differed from one location to another. In terms of yield alone, average values ranged from 1.2 tons per feddan at Serrw to 2.7 t/feddan at Gimmeza. These figures reflect constraints as well as successes at each production site.
Major causes of the low yields were the delays of planting dates behind the recommended optimum period between 15th May and 15th June. Another major factor was the inevitable poor soil conditions.
The delays were the results of coincidences of complex factors involved in the actual executions of the project agenda.
As explained in the earlier part of this overview, the sheer amount of labors demanded of each executive unit of the whole organization was overwhelming in view of the fact that almost every aspect of the required preparations and actual engagements was completely new to those who eventually got enlisted to the tasks. The logistics needed for supplying all the requirements of remotely scattered working units were simply

staggering but had to be fulfilled anyway. The field conditions of five farms were entirely unfamiliar to the staff in charge and had to be learned on site step by step through the actual experiences as the programmes went by.

Everyday, workers had to operate from the cramped lodging quarters improvised from the abandoned shanties far away from their families.

On some plots of the farms, the field preparation job had to wait until the evacuation of the previous crop was completed late in the season. Water allocation was not necessarily satisfactory for carrying out our working schedules, causing not so infrequent arrests of job progresses. In spite of all these retarding factors, the exerted efforts and the drive for accomplishments were extraordinary, helping neutralize the various constraints imposed and confronted. Actually, those yield figures seemingly unimpressive by the national average of 2.5 tons per feddan should be seen rather as a remarkable achievement in comparison with the yields available on the neighbouring fields of the comparable soil conditions, cultivated by the traditional method applied on an extensive scale like ours, which produced only about half of our results.

All in all, our experiences for this first year's satellite programmes should be deemed as bold attempts in face of the unknowns and basically exploratory in nature in the preparation for the real full-fledged engagements in the seasons to come. In that sense, at least, the activities have been very much on the successful and encouraging side, leaving lots of promising insights and hints for the future implementation.

TRAINING PERSPECTIVES

Revitalizing the capabilities of R. M. C. for training , programs were organized to offer opportunities to learn practical mechanization skills for those concerned with the technology dissemination, i.e., state farm engineers and technicians, extension officers and advisers, advanced farmers and university students. Starting from this season, our project expanded its sphere of activities to five new outreaching demonstration sites scattered around the Delta. The materials, manpower, and facilities were fully utilized for the purpose of enlightening those people otherwise unreacheable by the Center facility in Kafr El sheikh alone.

A total of 603 persons participated in the various courses offered to the public. A sort of mobile P.R. unit was organized to hold seminars, consisting of lectures on various topics, film shows, and field observations of actual machinery operations.

Such key technologies as nursery practices for raising healthy seedlings, with an emphasis on the importance of seed treatments, uniform seed distribution, adequate water management, and other ancillary techniques such as proper adjustments of controls on the operational implements, requirements for smoothly prepared planting bed, the best means for weed control, the ecology of blast disease and its control, etc., constitute the eternal requirements for a successful training program.
These techniques and skills can be acquired only through comprehensive curricula buttressed by heavy amount of practicals lasting for a specified period of time long enough to see and touch directly the progress of crop growth and the development of events in actual circumstances.
Audio-visual aids can effectively assist the understanding of special ideas and facts and were utilized to the advantage wherever it was possible to use them.

OBSERVATIONS ON THE STATE OF EXTENSION SYSTEM

Our project envisioned its ultimate function as the contribution to facilitating the dissemination of mechanization technologies down to actual production sites of farmers' fields, revolutionizing the entire technical system for the so-called goal of vertical expansion of the agricultural production. The project has been trying to get in touch with the actual farmers in some way or other to transmit the fruits of its endeavours for their benefits. But the available resources are too limited to reach to the vast area of actual rice farmers on our own. Obviously, we have to depend on the existing extension system for achieving our final goals.
Our questions were, firstly whether there existed at all any reliable institutional entities to which we could entrust the job of effectively educating the farmers for the technology settlement, and then, if so, what the problems and the directions for improvement were.
Our findings confirmed the importance of reeducation of extension officers and advisers for acquiring new knowledge and skills to be transmitted to the farmers.
Opportunities and material facilities are short in supply for effectively carrying out their tasks as active agents going freely between research institutions and farmers.
A need for creating small farmers' groups was identified. These groups are expected to function as a locally manageable unit subordinate to the existing larger cooperative organization. Extension officers and advisers will find these units to be more responsive to the extension efforts, and

the whole extension programs will be implemented in more socialized and collective background. Farmers will benefit from these institutional arrangements, not only in terms of economy by combining their financial and material resources, but also by being able to make the best use of the technical and managerial talents available within their peers. Examples of the procedures for forming these farmers' units and the kind of statutes for operating these organizations were presented as reference manuals.

I. VERIFICATION EXPERIMENTS ON TECHNICAL FACTORS

I - 1 TECHNOLOGIES FOR THE IMPROVEMENT OF FIELD CONDITIONS

I-1-1 GROWTH & YIELD RESPONSES OF MECHANICALLY TRANSPLANTED RICE TO UNDERGROUND DRAINAGE INSTALLATION IN SALINE SOIL PADDIES

1. Investigators: Alaa Shamly, Fetoh, T. Kato

2. Objectives : To determine the effects of installation of underground drainages on the growth and yield of rice mechanically transplanted on saline or alkaline soil paddies.

3. Experimental design and procedures:

   1) Treatments: 3 different kinds of underground facilities were installed in 1984 by construction work: (1) Corrugated pipe with rice husks [C+H] (2) Husks only [H] (3) Control [control] (without drainage), see construction specification chart, with 2 replicated blocks, total = 2x3 = 6 plots.

   2) Area of experimental block: 6 plots (around 1 feddan each) from D-block, a part of general production and demonstration blocks of R.M.C were used, see the map.

   3) Cultivation practices: Improved standardized methods practised by the Division in charge of general production and demonstration activities, comprising mechanical transplanting of young seedlings of variety IR-28, planed on.

   4) Items of measurements: Concentration of hydrogenions (ph) and electric conductivities (Ec) of soil and water, both irrigation and drainage, daily water consumption, yield components and total yield.

4. Summary of experimental results:

As common and basic soil treatments, 3 times of chisel plowing, intended depth at 15cm, with application of 1 t/f. of Gypsum, followed by deep tillage by subsoiler with a mole drainer.

1) Ph and Ec measurements of soil before puddling and after flooding at an early growing stage indicate that there exist wide differences among treatments. The soil from untreated plots always showed the highest values followed by that from husk-only plots and finally by that from corrugated pipe with husk plots.
In the case of two treatments with drainage facilities Ph and Ec measurements tended to decrease with the lapse of time after flooding. See Fig. 2.

2) Daily water consumption measured as the depth change of receding water level, hereafter called water recession depth (WRD), was smallest with untreated plots at 10mm day. WRD was largest with pipe plus husk plots with the value of 30mm/day, and medium with husk only plot with 20mm. Fig.1.

3) Comparison of Phs and Ecs measured with water samples taken from discharge ends of drainage pipes or ducts, indicated higher values for pipe plus husk plots than husk only ones. Incidentally, Ph and Ec for irrigation water were 6,8 and 0,85 respectively.
Conclusion derived from the above three observations suggests the likelihood of effective lea--ching of salts taking place as a result of improved water percolation from otherwise impervious soils by installation of drainage devices.

4) Plant height and tiller number at both middle and booting stages showed markedly higher values for treated plots. At the panicle initiation stage (July 26), the number of tillers per hill for pipe plus husk plot exceeded 45 which was 127% higher than that for control plots.

5) As for the yield components, wide differences among treatments were observed for culm length, panicle length, number of panicles per hill, and number of grains per panicle. Observed values were always

highest for pipe plus husk plot followed by those for husk only and finally by control plots in order. Number of panicles per hill and number of grains per panicle for pipe plus husk plots were 20.8 (120 % of control) and 121 (130 % of control) respectively.

6) Comparison of total yields indicates distinctly the yield increasing effect by drainage treatments. The yield of 4.35 ton/feddan was recorded for pipe plus husk plots which is 200% of control. The yield for husk only plots was 3.18 ton/f., 146% of control and 2.17 ton/feddan for untreated.

5. Conclusion:

Measurements of phsico-chemical properties of soil and water and analysis of rice growth characteristics have demonstrated that subtantial yield increases were attained as a result of enhanced rice growth which is in turn the consequence of improved soil properties due to effective leaching of saline fractions from soil matrix through artificially installed infiltration and drainage facilities.

6. Proposals for next year's experiments:

Determination of changes of soil moisture contents and soil hardness around the harvesting time.

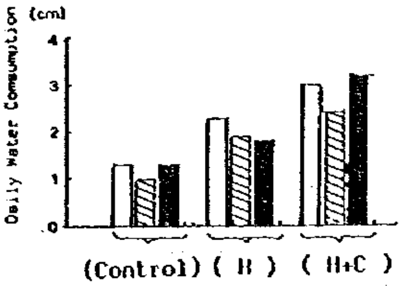


Fig. 1 Daily Water Comsumption

Notes; surveyed July22-24. Surveyed Aug. 1st Surveyrd Aug. 12

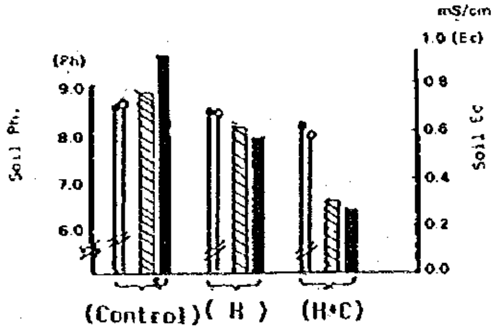


Fig. 2 Change of Ph & Ec of Soil.
(Soil layer 0 - 40 cm.)

Notes: Ph before irrigation; Ph after irrigation; Ec before irrigation; Ec after irrigation

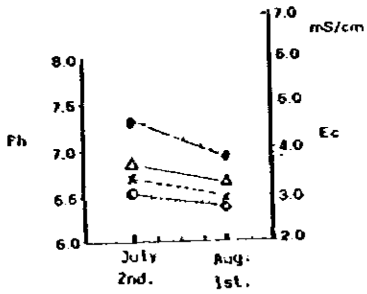


Fig. 3 Ph and Ec of Drainage Water

Notes: Ph in (H)Plot, Ph in (C+H)Plot, Ec in (H)Plot, Ec in (C+H)Plot.

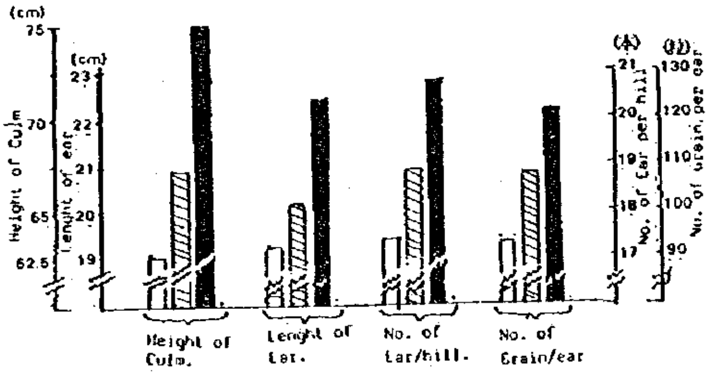


Fig. 5 Yield Conponent

Notes: (Control), (H), (C+H)

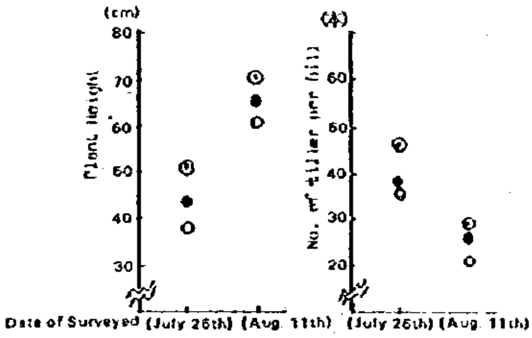


Fig. 4 Plant Height and No. of tiller per Hill.

Notes; ○ (Control), ● (H), ◎ (H+C)

Table 1. Paddy Yield

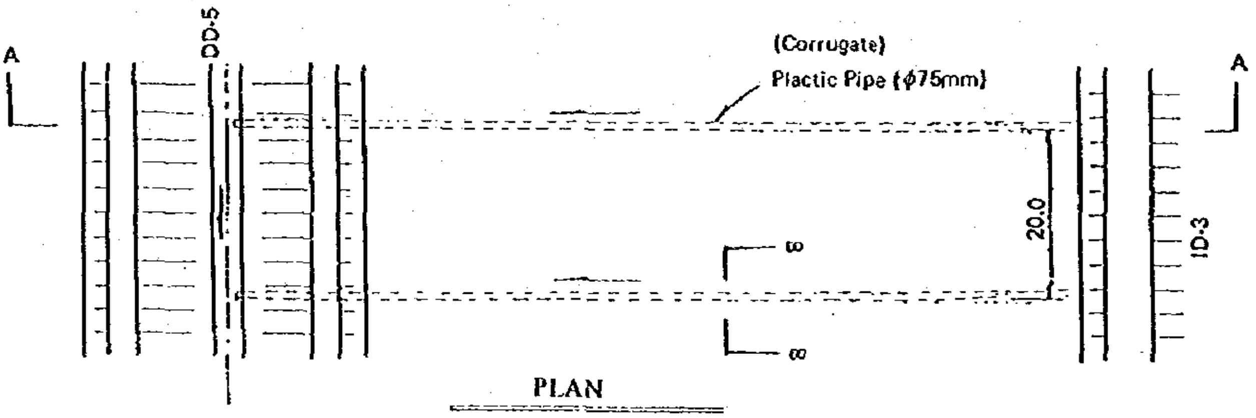
No.	Areas of Plot (Treatment)	Area of Plot (a)	Total yield by Treatment (kg)	Paddy yield per Unit area: Per Feddan (ton)	Per ha. (ton)
1	(C + H)	2650	2702	4.2[illegible]	10.7
2	-ditto-	2553	2672	4.41	10.6
Mean				4.3[illegible]	10.5
3	(H)	3049	2255	3.11	7.8
4	-ditto-	[illegible]	[illegible]	[illegible]	[illegible]
Mean				3.19	[illegible]
5	(Control)	3952	2047	2.18	5.3
6	-ditto-	3740	[illegible]	2.15	5.0
Mean				2.17	5.2

(Notes) Grain Moisture contents; 19 %

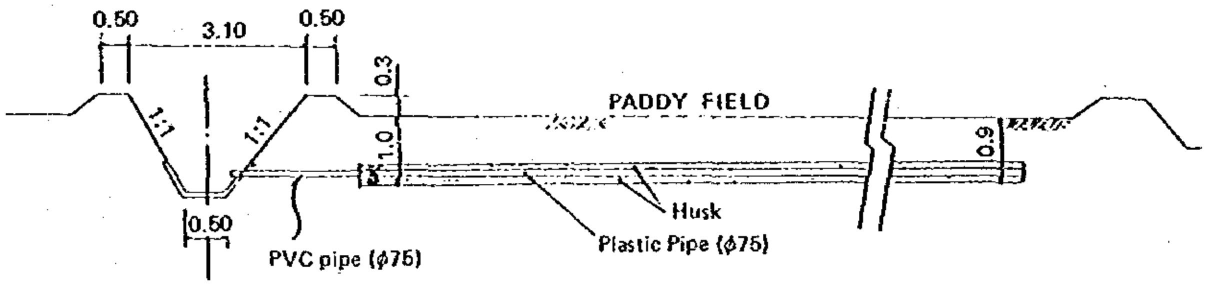
Appendix-I

Underground drainage works

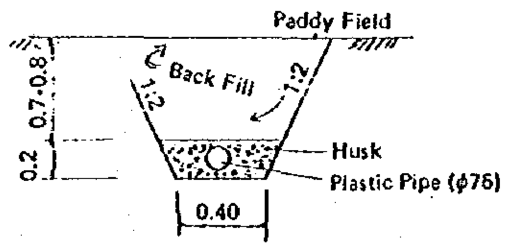
ATTACHMENT : 2)



PLAN

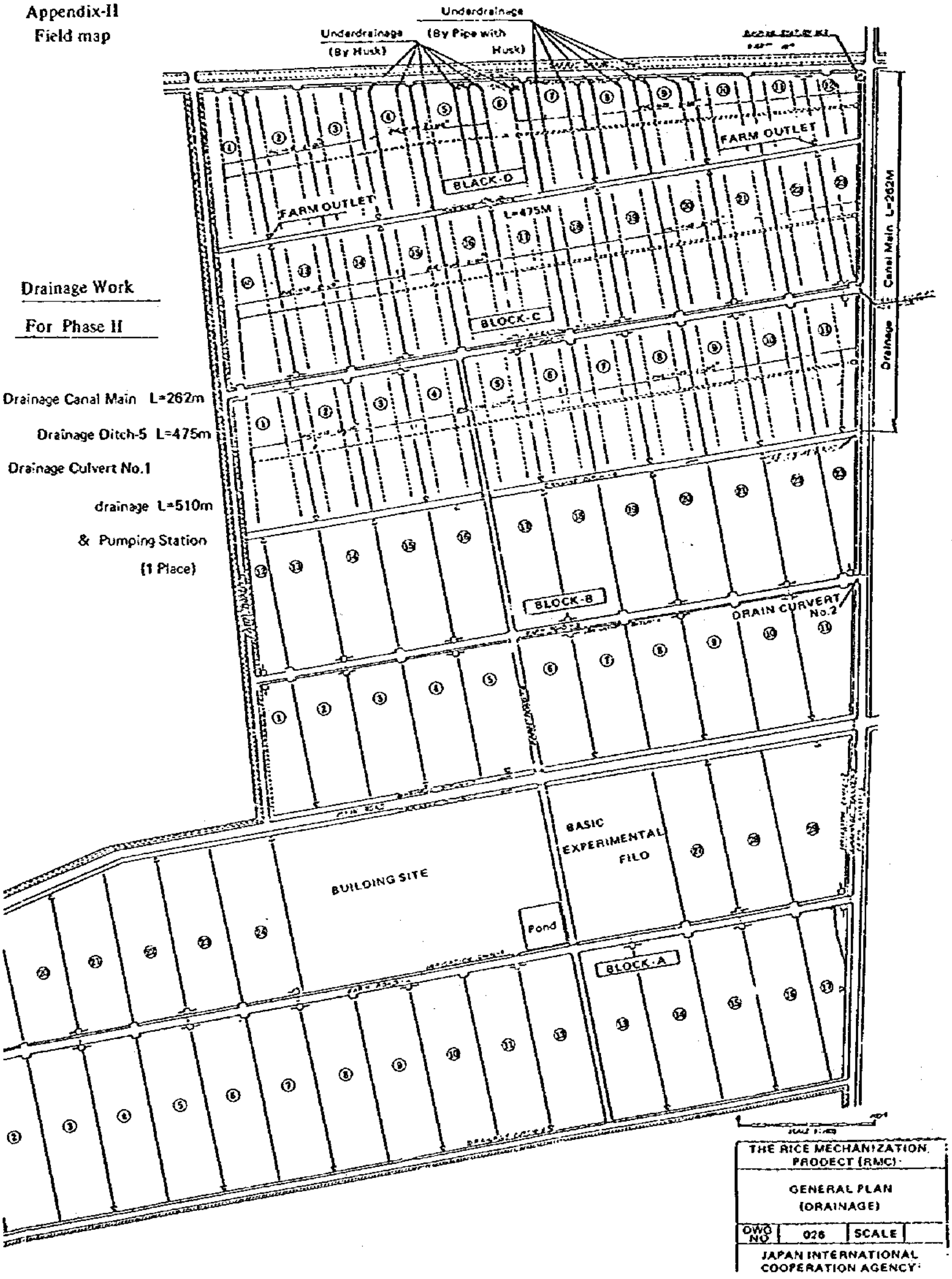


SECTION A - A



SECTION B - B

Appendix-II
Field map



I-1-2 ESTABLISHMENT OF RATIONAL LAND PREPARATION SYSTEM
PLOWING AND SOIL CRUSHING TECHNIQUE FOR DRY LAND SEEDING

Investigators: Shawky Mohamed, Iwao Matumoto

Objectives:

Providing germinating seeds with a favorable soil environment is the primary function of tillage operation. In the case of direct seeding on dry-land condition, the crushing of soil clods into smaller fractions is indispensable process to assure good germination of seeds. Because of the particular texture of the Delta soil, crumbling is usually not a easy task to perform satisfactorily, constituting a major constraint to this type of direct seeding practice. Examinations were intended to clarify factors influencing the desirable soil preparation techniques specifically applicable to dry-land direct seeding.

Experimental design and procedures:

Soil clod size distribution and the variation of seed placement depth were measured for the case of actual cultivation of direct seeded rice on the field at R M C. The field was prepared by the standard procedure, namely, two times chiseling, discing, and scraper levelling.

The soil clod size distribution was measured by weighing the fractions separated according to diameter sizes by using combination sieves of wire meshed square openings, with sizes, 1 CM × 1 CM, 2 CM × 2 CM, 4 CM × 4 CM, 6 CM × 6 CM, respectively.

The seed placement depth was determined by inspecting the conditions of young seedlings or seeds lifted out of ground two weeks after sowing.

Results

1. The vertical distributions of seeds drilled over the surface were observed to be very much dependent on the seedbed soil composition expressed in terms of clod size distribution. For two soil samples, in which the fraction of clods less than 2 CM in diameter composed 58 % and 78 % each, the quantities of seeds found within the soil stratum lying 1 CM from the surface were 30 % and 50 % of the total sown seeds. See the Table 1, treatments A and B.
2. The Table 2 shows the distributions of soil clod classified by sizes in diameter for the samples obtained from different field conditions. It shows that the degrees of pulverization are influenced to a great extent by the moisture contents of the particular soils at the time

of tillage operation. Over-dehydrated soils are very often found to be almost immune to any mechanical means of pulverization by their characteristics to form only large soil blocks during the primary break-down process. There are very few tools available to be able to work effectively on soil crumbs of such a hard consistency even for the secondary manipulation.

3. Seed germination was not observed probably mainly due to the poor viability of the used seed stock, and partly because of the inadequacy of the water management after seeding.

4. The Table 4 shows the transition of soil moisture contents after the plowing in autumn on the actual field. The recorded temperatures in November were, 23.9 C° max. and 11.3 C° min., humidities, 96 % and 44 %. The information provides us with some hints on how to time the spring tillage operation so that the maximum soil crushing would be effected.

Conclusion and discussions

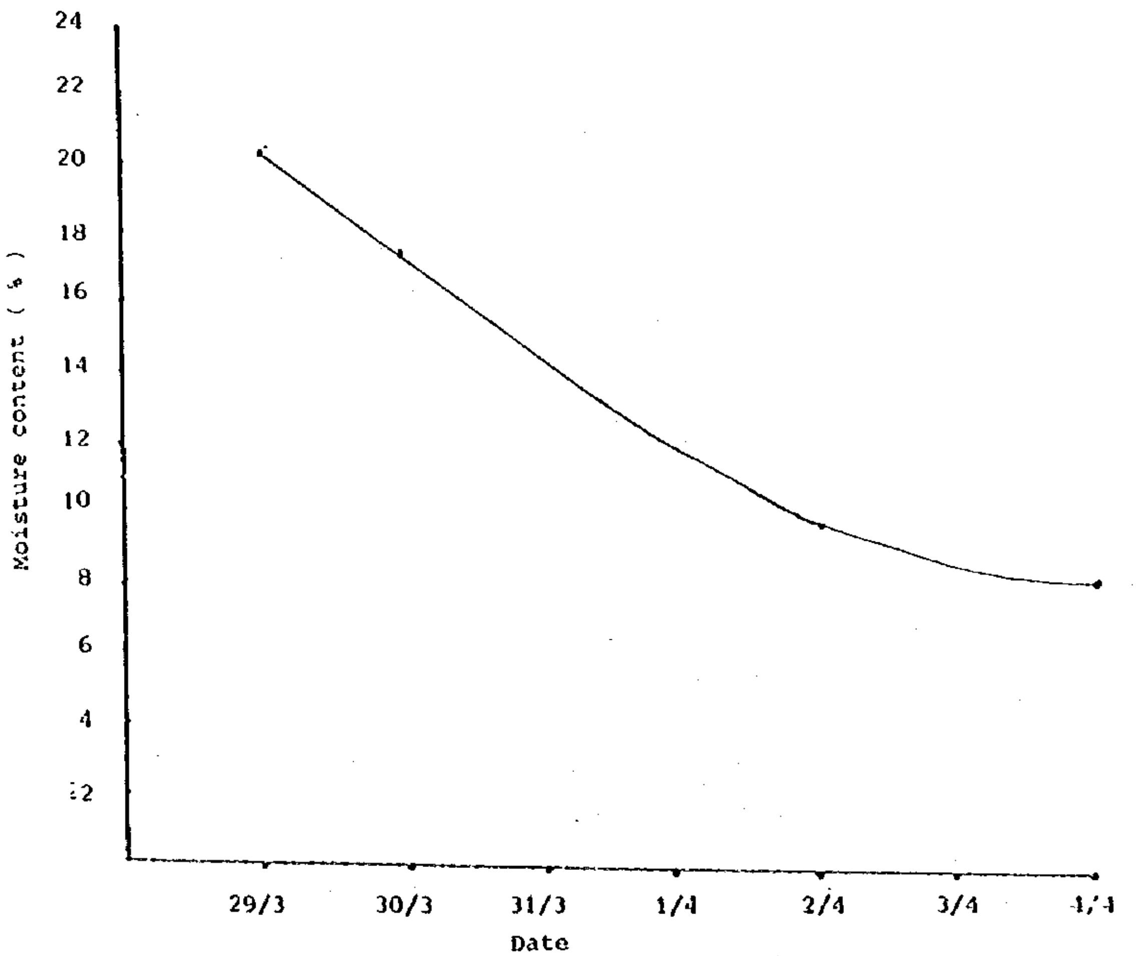
Certain technical means or operation systems have to be devised, so that the agronomic requirements of the seedbed are met. Past experiences dictate that , to obtain a good seedling establishment, the seedbed has to be prepared in such a way as to contain the soil clod composition with more than 80 % occupied by soil clods less than 2 CM in diameter.

With the state-of-arts of tillage implement, and with the knowledge that soil consistency undergoes transitional changes through the fallow season, the solution should be sought in selecting the timing of operation as well as the choice of adequate machinery to effect as much pulverization as possible. With these considerations in background, systematic investigation efforts are duely called for to clarify the changes in mechanical properties of the field soil during the winter, as related to the facilities for clod disintegration.

SOIL MOISTURE CONTENT AFTER PLOWING

Date	Moisture content (%)			Average (%)	Remarks
	S1	S2	S3		
29/3/88	21.66	19.54	--.--	20.60	At the same day
30/3/88	21.44	15.83	15.79	17.69	After 1 day
2/4/88	8.08	14.07	7.58	9.91	" 3 days
4/4/88	8.40	8.40	7.90	8.23	" 5 days

Block (A), plot (12)
(R.M.C) 1988



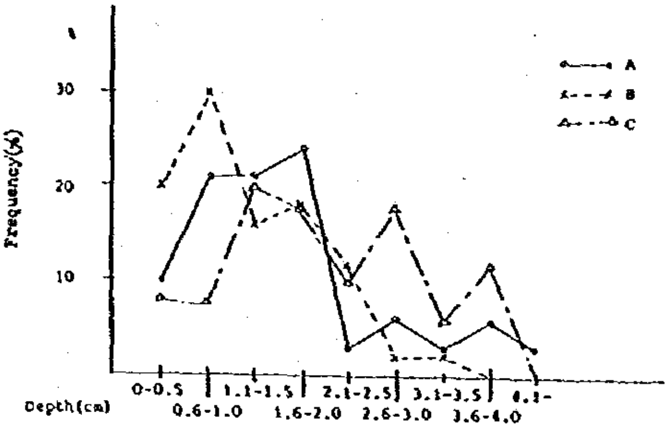


Fig: VARIATION OF SEED DEPTH AFTER SOWN IN DRY FIELD

Note; Treatment: A--- soaked seed, sown by hand
B--- dry seed, sown by seed drill
C--- dry seed, sown by seed drill

Soil condition:

clod dia,	less 1cm	1-2cm	2-4cm	4-6cm	6cm more
Sample A	27.3%	31.5%	26.0%	8.9%	6.0%
Sample B	53.0	25.8	18.0	2.4	-
Sample C	51.1	28.9	13.5	6.6	

Table: Result of soil Pulverization
-Distribution of soil clod-

No. Clod dia,	Less 1cm	1 - 2cm	2 - 4cm	4 - 6cm	6cm more
1.(plot No.11)	35.4 %	23.3%	26.5%	11.6%	6.[illegible]%
2.(plot No.15)	45.0	24.7	25.0	4.3	-
3.(plot No. 7)	27.3	31.5	26.0	9.9	6.[illegible]
4.(plot No.27)	53.0	25.8	18.0	2.4	-
5.(plot No.28)	51.1	28.9	13.5	6.6	
Average	42.5	26.8	21.8	7.0	

Note; Soil preparation-- 2 chisel + 1 Disk harrow + 1 Rotary + Laser plane

Table: Transition of soil moisture content

Date	18/11		22/11		25/11		29/11
	18.1%(5cm depth) 22.7%(10cm ") 23.2%(15cm ")	Chisel	Top soil 10.4% Average 12.5%	Chisel	Top soil 8.2% Average 14.0%	Land roller	Top soil 6.2% Average 12.7%

Note; Field-- Block-A, Plot No. 3 Date of paddy harvest; 3rd. Nov. 1987
Average temperature in November 1987; Max. 23.3C°, Min. 11.3C°
humidity; Max. 96.0%, Min. 44.9%

I-2 EVALUATION OF VARIETIES FOR CHARACTERISTICS RELEVANT TO MECHANIZATION PROCEDURES

I-2-1 SEED MULTIPLICATION AND FIELD DISPLAY OF 70 VARIETIES

1. Investigators; Samir KHADRE, Hikaru NIKI

2. Objectives ;

   1) To multiply the seeds of 50 representative Japanese varieties, 10 differential varieties for rice blast races discrimination and 10 new lines from Rice research Center of Egypt.

   2) To display and observe their field performances.

3. Experimental Design and Methods;

   1) Design; Simple cultivation without repetition.

   2) Varieties; Shown in Table 1.

   3) Location; BT Block, No.3 plot, RMC.

   4) Cultivation practices; Seedlings were raised in ordinary seedling boxes for transplanter, one variety (20 to 80g each) to one seedling box. Transplanted manually in one to three rows (9m length) according to the seed amount. Later, following the standard cultivation system of young seedlings.

      (1) Seeding date; 14th, May

      (2) Transplanting date; 13th, Jun.

      (3) Fertilization;

	Basal	1st T.D	2nd T.D	3rd T.D
N	60Kg/ha	25Kg/ha	25Kg/ha	13Kg/ha
P	60Kg/ha			
K	30Kg/ha			

      (1st top dressing was done 7 days after transplanting, 2nd, 20 days before heading and 3rd at heading).

      (4) Weed control; Hand weeding only.

      (5) Investigation Items; Incidences of diseases, Dates of heading and maturity, Lodging, Plant height, Number of grains per panicle, 1000 grains weight and Percentage of ripened grains.

4. Summary of results;

1) Brown spot disease (Helminthosporium leaf spot) was detected from two varieties (Kujuu and Kinmaze) by plant quarantine, which were abandoned.

2) Two varieties (Koganebare and Hatushimo) did not germinate at all, and finally 66 varieties were cultivated and yielded enough seed amounts for coming season.

3) 11 Japanese varieties (Koganehikari, Nipponbare, Yamahikari, Hoshinohikari, Minenishiki, Akibare, Koganenishiki, Shinrei, Sachikaze, Nishihikari and Reihou) and 2 local lines (Gz 1368 and IR 28) have received excellent ratings by overall observation check (Tab. 1 Ref.)

Table 1. RESULTS OF VARIETY DISPLAY, R M P, 1987

Varieties	No.	Diseases BL (1-2)	NBL	BL (5)	BS	Lodg %	Days of Head	Days of Mat.	Nos. of spikelets/ panicle	Plant Height	Panicle Length	Ripening ratio %	1000 grains weight (gm)	Ref.
Koshihikari	301	-	-	-	-	0	80	115	88.2	93.9	17.1	95.3	26.7	B
Sasanishiki	302	-	-	-	-	0	80	115	103.0	91.8	16.8	94.5	25.7	C
Akihikari	303	-	-	-	-	0	73	109	54.3	89.2	16.0	70.7	26.6	B
Toyonishiki	304	-	-	-	-	0	82	115	89.8	96.0	17.4	99.6	24.6	B
Todorokiwase	305	-	-	-	-	0	82	115	57.8	83.7	15.4	95.3	26.1	B
Hatsuboshi	306	-	3	-	-	0	83	115	61.5	87.1	16.6	96.3	28.4	B
Niigatawase	307	-	-	-	-	0	82	117	80.5	82.1	17.6	91.1	25.9	C
Akihomare	308	-	3	-	-	0	78	115	64.6	91.2	16.1	96.0	25.0	B
Koshijiwase	309	-	3	-	-	0	80	115	52.5	95.7	16.4	92.1	26.3	B
Fukuhikari	310	-	2	-	-	0	78	115	76.0	84.4	18.4	95.3	27.9	D
Koganehikari	311	-	2	-	-	0	83	115	78.4	89.2	16.2	96.6	27.2	A
Oozora	312	-	-	-	-	0	83	115	59.10	92.2	16.2	92.1	24.9	B
Satohonami	313	-	1	-	-	0	82	115	83.5	95.5	16.8	95.6	25.1	B
Akiyutaka	314	-	1	-	-	0	78	115	90.8	92.6	17.9	90.9	21.8	B
Hounenwase	315	-	2	-	-	0	78	115	56.2	92.8	16.7	94.6	25.7	C
Kagahikari	316	-	3	-	-	0	82	117	83.3	99.2	16.8	95.8	32.5	B
Naganohomare	317	-	1	-	-	0	83	115	68.7	92.0	15.6	95.5	26.7	B
Toyamanishiki	318	-	2	-	-	0	82	115	83.8	18.0	95.8	95.8	24.1	B
Shinanokogane	319	-	2	-	-	0	80	115	88.8	82.9	17.6	95.4	25.8	B
Nipponbare	320	-	2	-	-	0	85	119	84.5	89.9	16.9	95.3	26.8	A
Kojanebare	321	NO							Germinat	on	-	-	-	-
Yamahikari	322	-	-	-	-	0	85	119	81.5	89.4	15.2	96.9	26.2	A
Hoshinohikari	323	-	-	-	-	0	84	119	81.8	73.7	16.2	95.7	27.9	A
Yamabiko	324	-	-	-	-	0	86	119	90.2	88.2	19.1	97.2	28.7	B
Yamahousi	325	-	-	-	-	0	86	119	107.6	96.9	17.0	94.9	25.7	B
Harebare	326	-	-	-	-	0	91	119	106.8	93.7	18.5	94.4	25.8	B
Minenishiki	327	-	-	-	-	0	83	119	81.6	88.9	17.6	96.0	27.0	A
Aoisora	328	-	-	-	-	0	87	119	78.6	75.6	17.9	96.2	28.1	B
Akibare	329	-	-	-	-	0	91	119	75.5	91.1	16.2	96.7	24.5	A
Akitsuho	330	-	-	-	-	0	85	119	104.0	95.1	19.5	95.2	27.4	C
Akenohoshi	331	-	2	-	-	5	96	129	114.8	103.8	22.8	88.4	26.9	B
Sasaminori	332	-	-	-	-	0	83	125	69.2	82.8	16.6	86.0	27.2	B
Kiyonishiki	333	-	2	-	-	0	83	121	85.4	88.4	16.2	96.8	25.6	B
Musashikogane	334	-	2	-	-	0	84	126	65.4	79.4	16.2	83.1	25.5	B
Koganenasari	335	-	3	-	-	0	83	126	89.0	83.9	20.2	94.0	24.5	C
Nakateshinsenbon	336	-	1	-	-	0	91	126	83.7	92.6	17.5	97.5	27.8	B

Varieties	No.	Diseases BL (1-2)	NBL	BS (5)	BS	Lodg	Days of head	Days of Maturity	Nos. of spikelets /panicle	Plant Height	Panicle Length	Ripening ratio	1000 grains weight (gm)	Ref.
Koganenishiki	337	-	2	-	-	0	93	125	117.8	105.7	19.7	90.9	26.5	A
Kujou	338	-	-	cancel		-	-	-	-	-	-	-	-	-
Kinmaze	339	-	-	cancel		-	-	-	-	-	-	-	-	-
Aokaze	340	-	1	-	-	0	91	125	84.8	83.4	16.2	95.7	26.9	B
Nishihomare	341	-	2	-	-	0	92	125	99.4	92.0	19.4	95.3	28.1	B
Shinrei	342	-	1	-	-	0	92	126	82.2	104.3	21.2	96.8	26.3	A
Sachikaze	343	-	2	-	-	0	93	133	84.0	92.7	18.1	95.5	27.5	A
Nishihikari	344	-	2	-	-	0	96	140	63.1	77.7	18.4	96.4	25.8	A
Mineyutaka	345	-	2	-	-	0	91	135	84.3	84.0	19.8	94.1	26.5	B
Reihou	346	-	2	-	-	0	98	140	107.5	89.3	18.2	95.1	25.9	A
Hatsushimo	347	-	No	Germinati	on		-	-	-	-	-	-	-	-
Minaminishiki	348	-	1	-	-	0	103	135	92.6	85.8	19.1	88.5	25.2	
Fuyou	349	-	1	-	-	0	96	129	101.0	95.6	19.2	94.4	26.1	
Hoorei	350	-	1	-	-	0	84	122	67.2	83.9	14.6	81.0	26.4	
Shin 2	351	-	2	-	-	0	84	122	74.3	93.1	17.2	95.5	24.3	
Aichiasahi	352	-	3	-	-	0	85	123	68.7	83.2	20.0	95.5	29.6	
Ishikari Shiroke	353	-	-	-	-	5	60	129	41.1	83.8	13.4	97.9	26.3	
Kanto 51	354	-	2	-	-	0	85	133	73.6	93.0	18.0	97.8	24.3	
Tsuyuake	355	-	1	-	-	0	87	122	74.4	90.9	18.2	83.2	27.4	
Fukunishiki	356	-	4	-	-	0	87	123	61.9	83.1	16.9	94.4	26.1	
Yashiromochi	357	-	2	-	-	5	91	125	82.3	99.9	19.0	86.7	29.7	
PI No.4	358	-	2	-	-	5	92	125	100.7	98.2	19.3	92.9	27.1	
Toride 1	359	-	2	-	-	5	92	126	92.0	97.6	18.0	89.8	23.3	
BL 1	360	-	3	-	-	0	90	125	108.6	03.5	18.5	93.8	26.5	
Giza 171	361	-	4	-	-	30	113	154	113.4	03.5	18.5	78.8	22.5	C
Giza 172	362	-	2	-	-	80	105	142	121.0	09.3	19.4	93.7	24.9	B
Giza 175	363	-	1	-	-	90	98	134	134.4	76.6	20.4	79.1	20.1	A
Giza 181	364	-	1	-	-	20	105	139	143.3	89.1	22.0	90.3	25.5	B
Gz 1368	365	-	1	-	-	0	99	134	123.2	95.1	19.3	83.7	23.8	A
Gz 1108	366	-	3	-	-	0	91	132	95.0	94.5	21.3	98.6	24.9	B
Gz 2175.5.4	367	-	1	-	-	20	101	139	112.5	86.0	18.9	88.1	25.9	B
Gz 2175.5.6	368	-	1	-	-	60	103	142	107.8	88.6	20.5	94.4	25.3	B
IR 28	369	-	2	-	-	0	96	130	128.1	83.4	23.2	95.6	22.6	A
IR 19743-46	370	-	1	-	-	0	96	130	117.3	90.5	21.0	97.7	25.7	B
	371	-	2	-	-	0	87	130	83.4	95.6	18.2	95.0	27.0	B

I - 3 DETERMINATION OF OPTIMUM FACTOR LEVELS FOR DIRECT SEEDING CULTIVATION

I-3-1 EXPERIMENT ON SEEDING DENSITY IN DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION

1. Investigators; Ibrahim ZOHIER, Hikaru NIKI
2. Objectives ; To study optimum seeding density in direct seeding cultivation method under dry condition.
3. Experimental Design and Methods;
   1) Design ; Randomized Complete Block
   2) Treatments; 4 levels of seed amounts.
      30Kg/ha, 50Kg/ha, 70Kg/ha and 90Kg/ha
   3) Repetition; 4
   4) Variety ; Giza 175
   5) Location ; R M C, Block A, plot No. 12
   6) Cultivation practices; Seeds were drill-seeded manually in small ditches on the dry field, which were submerged for one day. Then intermittent irrigations were given until around one month after seeding.
      (1) Seeding date; 4th, June.
      (2) Fertilization;

         Basal.......40 - 60 - 30Kg (N - P - K)/ha
         Top Dress...20 - 25 - 25 - 13Kg N/ha (20 and 40 days after seeding, 20 days before heading and at heading).

      (3) Weed control;
         A. DCPA 6 l/ha + Benthiocarb 6 l/ha..... 25 days after seeding
         B. Pyrazolate 30 Kg/ha..... 40 days after seeding.
   7) Investigation Items; Sprouting ratio, Dates of heading and maturity, Lodging, Plant height, Panicle length, Incidences of diseases, Yield components (panicle Number per m^2, Grain number per panicle, 1000 grains weight and Ripening ratio) and Yield,

4. Summary of results;

1) Sprouting ratio was 10.3% and may have affected the yield.

2) Clear difference could not be observed among the treatments, though, 4.69 t/ha was recorded in 50Kg seed/ha treatment, being the highest among the treatments.

3) Insufficient number of seedling stand could be the main reason for small number of panicles.

5. Conclusion;

1) No clear result was obtained for seeding density under dry condition.

2) Seedling stand is as important as weed control in this cultivation system.

3) Seed germination test is essential before experiment.

Table 1. SEEDING DENSITY EXPERIMENT ON DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION, 1987, R M C

Treatment (Seed Amount)	Seedling stand per m²	Sprout ratio (%)	Days to Head	Days to Mat.	Diseases /1 BL (1-2)	BL (5)	NBL	BS	Lodg %	Plant height (cm)	Panicle length (cm)	Nos. of panicle m²	Nos. of sp./panicle	Ripening ratio %	1000 grain weight (g)	Grain yield /2 t/ha	(t/f)
A- 30 Kg/ha	15.3	10.7	92	134	1	1	1	1	0	86.6	22.2	312.5	168.1	94.1	20.8	4.37 a	(1.84)
B- 50 Kg/ha	28.8	12.1	92	134	1	1	1	1	0	85.2	22.4	321.7	160.6	94.3	20.6	4.69 a	(1.97)
C- 70 Kg/ha	32.1	9.6	92	134	1	1	1	1	0	85.2	21.7	341.6	145.2	84.7	20.7	4.37 a	(1.84)
D- 90 Kg/ha	37.9	8.8	92	134	1	1	1	1	0	83.8	22.1	332.1	150.9	93.8	20.5	4.59 a	(1.93)
Average	28.5	10.3	92	134	1	1	1	1	0	84.8	22.1	327.0	146.2	91.7	20.6	4.51	(1.90)
C.V. (%)	-	-	-	-	-	-	-	-	-	2.2	2.4	14.1%	25.6	9.6	1.8	21.5	

Note..... /1 BL(1-2) = Leaf Blast in seedling time, BL(5) = Leaf Blast in Heading time, NBL=Neck Blast

BS=Brown Spot, Score is 1 to 5, from no symptom, Moderately Resistant, Intermediate, Susceptible and Severely Susceptible, respectively.

/2 Yield corrected to 14% moisture contents.

I-3-2 EXPERIMENT ON WEED CONTROL IN DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION

1. Investigators; Rabia HAMADA, Hikaru NIKI

2. Objectives ; Weed control is one of two principal subjects to be studied to establish direct cultivation system (other one is seedling stand establishment). This experiment is planned to find out and determine approp-riate herbicide combination in this system under dry condition. Main target of weeds were Echinochloa crusgari and Cyperus rotundus.

3. Experimental Design and Methods;
   1) Design ; Randomized complete block
   2) Treatments;

No.	After sprout in dry condition (15 - 20 days) after seeding	After sprout in wet cond. (20 - 22 days) after seeding	30 - 40 days after seeding
1	-----	-----	-----
2	DCPA 61	-----	Bentazone
3	DCPA 101	-----	Bentazone
4	Benthiocarb 51	-----	Bentazone
5	Benthiocarb 91	-----	Bentazone
6	Benthiocarb 131	-----	Bentazone
7	DCPA 81 + Benthiocarb 41	-----	Bentazone
8	DCPA 41+ Benthiocarb 61	-----	Bentazone
9	DCPA 41 + Benthiocarb 81	-----	Bentazone
10	-----	Pyrazolate	Bentazone
11	DCPA 61	Pyrazolate	Bentazone
12	-----	Pyrazolate+ Benthiocarb81	Bentazone

(Chemical amounts are per ha)

3) Repetition; 4

4) variety ; Giza 175

5) Location ; A block, No.12 plot, R M C

6) Plot area ; 3.5m x 4.8m = 16.8,²

7) Cultivation practices; Seeds were drill-seeded manually in small ditch on dry field, which were submerged one day. Then intermittent irrigations were given whenever necessary until around one month after seeding.

(1) Date of seeding; 4th, Jum.

(2) Fertilization ;

	Basal	1st T.D	2nd T.D	3rd T,D	4th T.D
N	40Kg/ha	20Kg/ha	25Kg/ha	25Kg/ha	13Kg/ha
P	60Kg/ha				
K	30Kg/ha				

(1st top dressing was done 20 days after seeding, 2nd, 40 days after seeding, 3rd, 20 days before heading and 4th at heading).

8) Investigation Items; Weed (Echinochloa spp.) amount (dry weight) and yield.

4. Summary of results;

1) Principal noxious weed was Echinochloa spp. only.

2) Germination ratio of seeds was extremely low, and this fact affected all of this experiment.

3) No clear difference between 61/ha and 101/ha of DCPA was observed, mainly due to the late application time.

4) Controlling effects of Benthiocarb increased according to the increase of dosage of the chemical. No plant toxicity was seen in any dosages.

5) The effects of Pyrazolate was not clear.

5. Conclusion;

1) Benthiocarb seems to be better than DCPA as the initially applied herbicide.

2) The effect of DCPA fluctuates according to application time, soil moisture, etc.

3) The combination of Benthiocarb 9 1/ha and Bentazone 30 days after seeding seems to be a practical one.

Table 1. EXPERIMENT OF WEED CONTROL D. S. (DRY CONDITION) R M P, 1987

No.	TREATMENT			RESULT (WEED)	GRAINS	
	After sprouting 15 - 20 days (Dry condition)	After sprouting 20 - 22 days (Under water)	After 30 - 40 Days	Echinochloa spp. Dry weight (g)	Yield T/h	(T/f)
1	-	-	-	127.3 abc	0.85	(0.36) c
2	DCPA 6L	- -	Bentazone	160.7 a	0.75	(0.32) c
3	DCPA 10L	- -	Bentazone	146.3 ab	1.27	(0.53) bc
4	Benthiocarb 5L	- -	Bentazone	60.1 bc	1.80	(0.76) ab
5	Benthiocarb 9L	- -	Bentazone	62.9 bc	2.31	(0.97) a
6	Benthiocarb 13L	- —	Bentazone	35.3 c	1.94	(0.82) ab
7	DCPA 8L + Benthiocarb 4L	- -	Bentazone	96.2 abc	1.37	(0.58) bc
8	DCPA 4L + Benthiocarb 6L	- -	Bentazone	72 abc	2.05	(0.86) ab
9	DCPA 4L + Benthiocarb 8L	- -	Bentazone	76 abc	2.08	(0.87) ab
10	- -	Pyrazolate	Bentazone	164.1 a	1.54	(0.65) abc
11	DCPA 6L	Pyrazolate	Bentazone	60.3 bc	2.12	(0.89) ab
12	- -	Pyrazolate Benthiocarb 8L	Bentazone	129.4 abc	1.52	(0.64) abc
Av.				99.2	1.62	(0.68)
C.V.				58.8%	34.2%	

I-3-3 WATER MANAGEMENT TRIAL ON DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION

1. Investigators; Ibrahim ZOHIER, Hikaru NIKI

2. Objectives ; Irrigation just after seeding is essential to get unifor germination stands in direct seeding cultivation method under dry condition in Egypt, since soil moisture then is too dry for germination. Thus, first irrigation may give sufficient moisture to the soil and seeds. While, prolonged irrigation after seeding may suffocate germinated seed fatally. So, we must clarify the optimum duration of first irrigation. Our another target in this experiment is to determine best pre-germination treatment.

3. Experimental Design and Methods;
   1) Design; Simple trial without repetition
   2) Treatments;
      (1) Duration of submergence = 4 levels
      One day, Two days, Three days, Four days.
   3) Plot area; 150m^2
   4) Variety ; Giza 175
   5) Location ; R M C Block A, No. 12 plot
   6) Cultivation practices; The seeds with 3 levels of pre germination treatments mentioned above were sown on the dry field, and were submerged for one to four days. Then, intermittent irrigations were given to all plots according to the necessity.
      (1) Seeding date; 4th, June.
      (2) Fertilization; (per hectare)

	Basal	1st T.D.	2nd T.D.	3rd T.D.	4th T.D.
N	40Kg	25Kg	25Kg	25Kg	13Kg
P	60KG				
K	30Kg				

(3) Weed control;

A. DCPA 6 l/ha + Benthiocarb 6 l/ha.......25 days after seeding.

B. Pyrazolate 30Kg/ha........ 40 days after seeding.

7) Investigation Items; Sprouting ratio, Dates of heading and maturity, Lodging, Plant height, Panicle length, Incidences of diseases, Yield components and yield.

4. Summary of results;

1) High significant differences with 99% level have been confirmed in seedling stand ratio for both treatments, water management and seed treatment.

2) Highest seedling stand ratio was obtained with one day submergence treatment. The ratio gradually decreased according to the prolonged duration. The tendency was observed in all seed treatments.

3) About seed treatment, the highest seedling stand was observed with dry seed, while the lowest with pre-germinated seed.

4) The reason for the above was not clarified in this trial.

5) There is positive coefficient of correlation between seedling stand ratio and yield, as is seen in Fig.1-1 ($r = 0.4874$)

6) Optimum seedling stand number per m^2 was not clarified in this trial, although, it seems to be more than $121/m^2$

5. Conclusion;

1) It is assumed that most suitable water submergence duration just after seeding in direct seeding method under dry condition is one day.

2) We may be able to expect best result by dry seed treated with insecticide and fungicide in this cultivation method.

6. Discussion;

The reason why seedling stand ratio of pre-germinated seeds is low in this cultivation method may be an interesting question for the future. It could be useful if this trial would be repeated again under more precise management.

Table 1. WATER MANAGEMENT TRIAL ON DIRECT SEEDING METHOD UNDER DRY CONDITION - 1987, R M C

Treatment		Seedling stand per m²	Head date	Mat. date	Diseases /1 BL (1-2)	NBL	IG	BL (5)	Lodg %	Plant Height (cm)	Panicle length (cm)	Nos. of panicle /m²	Nos. of sp./ panicle	R.R	1000 grains weight	Yield /2 t/ha	(t/10a)
One day	Dry seed	121	93	135	1	1	1	1	60	79.3	21.4	361	116.5	91.9	20.9	5.41	(2.28)
	Soaking only	109	93	135	1	1	1	1	50	77.6	21.7	281	121.7	91.8	20.7	5.27	(2.22)
	Soaking+germ.	71	93	135	1	1	1	1	35	82.3	22.0	421	135.4	93.1	20.5	5.55	(2.34)
Two days	Dry seed	91	93	135	1	1	1	1	80	79.2	20.3	330	126.7	90.1	19.9	4.20	(1.77)
	Soaking only	105	93	135	1	2	1	1	80	79.1	21.3	351	131.9	93.3	19.9	4.73	(1.99)
	Soaking +germ.	54	93	135	1	1	1	1	60	84.3	21.6	418	130.2	91.6	20.9	6.72	(2.83)
Three days	Dry seed	100	93	135	1	1	1	1	60	79.1	21.4	252	129.6	94.4	20.2	4.76	(1.99)
	Soaking only	86	93	135	1	1	1	1	70	80.2	21.1	301	113.8	94.0	20.5	4.34	(1.83)
	Soaking+germ.	47	93	135	1	1	1	1	80	80.1	22.9	377	163.3	90.3	19.6	4.37	(1.84)
Four days	Dry seed	74	93	135	1	1	1	1	80	76.8	21.2	266	125.4	83.4	21.0	4.17	(1.76)
	Soaking only	48	93	135	1	1	1	1	80	76.6	22.0	180	132.1	90.5	19.4	2.33	(0.98)
	Soaking+germ.	17	93	135	1	1	1	1	50	79.6	20.8	280	113.8	91.7	19.4	2.48	(1.05)
AVERAGE			93	135	1	1.1	1	1	65.4	79.5	21.4	318.5	128.5	91.5	20.2	4.53	(1.91)

Note..... /1 BL(1-2) = Leaf Blast in seedling, BL(5) = Leaf Blast in Heading, NBL = Neck Node Blast

/2 Corrected for 14% of moisture contents

/3 40 days after seeding

Table 1-2 TABLE OF YIELDS & SEEDLING STANDS
(WATER MANAGEMENT TRIAL ON D.S. DRY) - 1987, RMC

Seed Treatment \ Irrigation Treatment	1 1 day	2 2 days	3 3 days	4 4 days	Average
1 dry seed	5.41 (121)	4.20 (91)	4.76 (100)	4.17 (74)	4.64 (96.5)
2 Soaking Only	5.27 (109)	4.73 (105)	4.34 (86)	2.33 (48)	4.17 (87.0)
3 Soaking + Germination	5.55 (71)	6.72 (54)	4.37 (47)	2.48 (17)	4.78 (47.3)
A V E R A G E	5.41 (100.3)	5.22 (83.3)	4.49 (77.7)	2.99 (46.3)	4.53 (76.9)

Note...... Values are t/ha, (   ) are seedling stand No. per m² measured 40 days after seeding

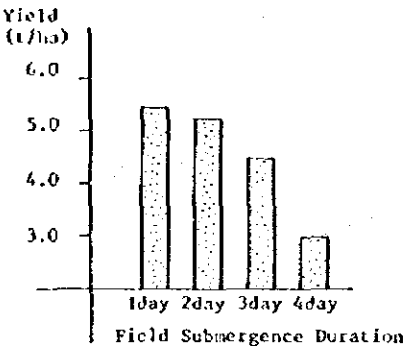


Fig.1-2 Yields of each Water Management

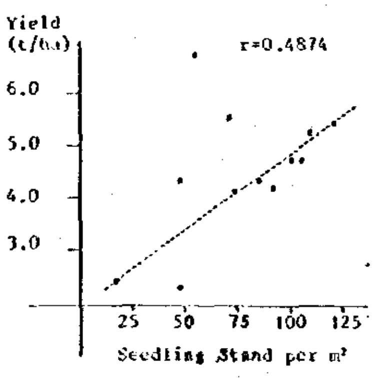


Fig.1-1 Seedling Stand and Yield

I-3-4 SEEDING DENSITY AND FERTILIZER EXPERIMENT ON DIRECT SEEDING CULTIVATION METHOD UNDER WET CONDITION

1. Investigators; Mustafa ESSEA, Hikaru NIKI

2. Objectives ; To study most optimum seeding density and nitrogen amount in direct seeding culti-- vation method under wet condition.

3. Experimental Design and Methods;

 1) Design ; Split plot

 2) Treatments;

  a. Seeding density; 20Kg/ha, 40Kg/ha, 60Kg/ha and 80 Kg/ha

  b. Nitrogen amounts;60Kg N/ha, 90Kg N/ha, 120 Kg N/ha and 150 Kg N/ha

 3) Repetition; 4

 4) Variety ; Giza 175

 5) Location ; R M C A Block No.14

 6) Plot area ; $20m^2$

 7) Cultivation practices; Pre-germinated seeds were sown on puddled paddy field, and water was kept about 2 weeks, followed by drainage after sprouting. The field managements of transplanting system were applied since one month after seeding.

  (1) Seeding date; 21st, May

  (2) Fertilization;

	Basal	1st T.D.	2nd T,D.	3rd T.D.	4th T.D.
N	34%	16%	20%	20%	10%
P	60Kg/ha				
K	30Kg/ha				

(1st T.D. is 20 days after seeding, 2nd = 40 days after seeding, 3rd = 20 days before heading and 4th at heading)

  (3) Weed control;

   a. Pyrazolate G. 30Kg/ha.......Just after seeding

   b. Benthiocarb G. 30Kg/ha......24 days after seeding

8) Investigation Items; Sprouting ratio, Incidences of diseases, Lodging, Dates of heading and maturity, Plant height, Panicle length, Yield components and Yield.

4. Summary of results;

1) Increasing tendency of lodging according to the increase of seed amounts has been observed (Tab.1-1).

2) Total average was 10.73 t/ha.

3) Highest yield, 11.81 t/ha, has been obtained in the treatment of 60 Kg/ha seeds and 150Kg N/ha of nitrogen amounts.

4) Highest yield among two treatments was gotten in 60 Kg/ha for seed amount treatments and 150 Kg/ha of Nitrogen for Nitrogen amount treatments (Tab. 1-2).

5) Yield has increased according to the increase of Nitrogen amounts (Fig. 2).

5. Conclusion;

1) When water management at early stage and weed control are appropriate, the direct seeding cultivation method under wet condition could be one of positive ways.

2) Although highest yield has been obtained by 60Kg/ha of seed, the dosage not be applied to farmer level directly.

3) Optimum Nitrogen amount for this cultivation system by Giza 175 seems to be existing in the range higher than 120 Kg N/ha.

Table 1 - 1

SOWING DENSITY & FERTILIZER EXPERIMENT ON DIRECT SEEDING CULTIVATION METHOD UNDER WET CONDITION 1987, R M C

Treatments Nos. I Seed A	II Nitrogen	Days to Head	Days to Maturity	Diseases /1 BL (1-2)	BL (5)	NBL	Percentage of Lodging %	Plant Height (cm)	Panicle Length (cm)	No. of spikelet /panicle	No. of panicle m²	Ripening ratio %	1000 grains weight	Yield /2 Ton/ha	Yield /2 (Ton/Feddan)
20 Kg/ha	60 Kg/ha	88	132	1	1	1	20	90.7	21.9	129	521	92.8	20.6	10.09	(4.24)
	90 "	87	131	1	1	1	27	87.7	21.7	124	610	93.6	20.9	10.56	(4.44)
	120 "	88	131	1	1	1	20	95.8	22.3	117	559	90.8	21.0	10.41	(4.37)
	150 "	88	132	1	1	1.5	18	96.9	22.4	137	538	91.5	20.7	10.82	(4.54)
40 Kg/ha	60 Kg/ha	87	130	1	1	1	24	91.7	20.7	106	672	92.0	20.8	11.08	(4.65)
	90 "	86	130	1	1	1	06	89.3	20.3	118	655	94.0	20.9	10.74	(4.51)
	120 "	87	131	1	1	1.5	17	89.7	20.9	106	646	93.6	21.1	11.13	(4.67)
	150 "	86	130	1	1	1.5	26	90.9	20.5	116	595	93.6	20.8	11.04	(4.64)
60 Kg/ha	60 Kg/ha	86	130	1	1	1	09	85.9	19.8	96	675	90.4	20.8	10.66	(4.48)
	90 "	86	130	1	1	1	21	87.7	21.6	108	620	92.1	20.9	11.07	(4.65)
	120 "	86	130	1	1	1.3	41	88.7	20.8	103	641	93.6	21.1	11.64	(4.89)
	150 "	86	130	1	1	1.5	43	87.9	20.9	97	719	93.5	21.1	11.81	(4.96)
80 Kg/ha	60 Kg/ha	86	130	1	1	1.3	08	84.1	19.2	89	754	93.1	21.3	9.88	(4.15)
	90 "	86	130	1	1	1.5	26	84.0	19.4	79	746	94.0	21.1	9.88	(4.15)
	120 "	85	129	1	1	1.8	45	89.4	19.7	99	836	89.5	21.5	10.62	(4.46)
	150 "	85	129	1	1	1.8	30	85.0	20.4	98	728	94.4	21.2	10.33	(4.34)
Total Average		86	130	1	1	1.3	24	89.1	20.8	108	657	92.7	21.0	10.73	(4.51)
C.V. I		-	-	-	-	9.76	60.99	3.75	3.40	8.6	10.97	2.21	1.34	8.77	
C.V. II		-	-	-	-	28.44	55.01	3.63	4.16	15.3	11.67	3.96	1.82	4.44	

Note............/1 BL (1 - 2) = Leaf Blast in seedling, BL(5) = Leaf Blast in Heading, NBL = Neck Node Blast

/2 Corrected for 14% of moisture contents

Table 1 - 2 YIELD AVERAGE (SOWING DENSITY & FERTILIZER EXP. D. S. WET, t/ha)

Nitrogen / seed amount	60 Kg/ha	90 Kg/ha	120 Kg/ha	150 Kg/ha	Average
20 Kg/ha	10.09	10.56	10.41	10.82	10.47 a
40 Kg/ha	11.08	10.74	11.13	11.04	11.00 a
60 Kg/ha	10.66	11.07	11.64	11.81	11.29 a
80 Kg/ha	9.88	9.88	10.62	10.33	10.18 a
Average	10.43 a	10.56 a	10.95 a	11.00 a	10.73

* (Values followed by the same letter are not significantly different at the 5% level)

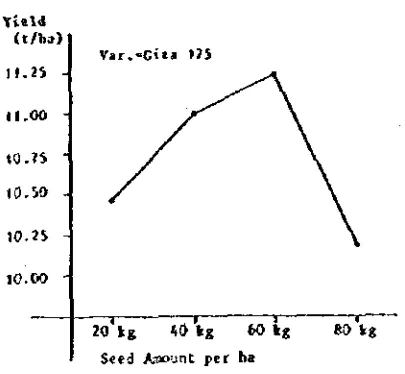


Fig. 1 Seed Amount and Yield
(Direct Seeding-Wet Condition)

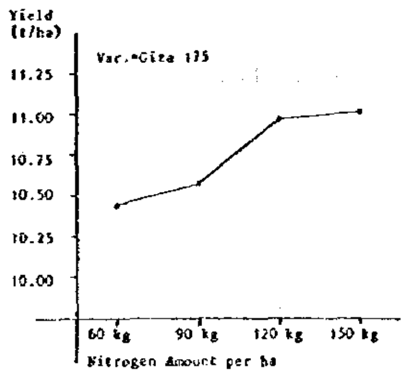


Fig. 2 Nitrogen Amount and Yield
(Direct Seeding - Wet Condition)

I-3-5 WEED CONTROL IN DIRECTLY SEEDED RICE ON WET CONDITION

1. Investigators; Rabia Hamada, Samir Khader, Hikaru Niki
2. Objectives ; To find the optimum combinations of herbicides in order to establish the weed control measures against the weed pests in the rice directly broadcast on wet-land paddy.
3. Experimental design and procedures;
   1) Design; Randomized blocks
   2) Treatments; 12 combinations of herbicides, i.e., Oxadiazon, Benthiocarb, Molinate, MO, Pyrazolate, Bentazone. For specifies, see Table 1-1.
   3) Replication; 4
   4) Variety; Giza 175
   5) Location; R M C A-Block No.14
   6) Plot area; 3m x 5m = $15m^2$
   7) Cultivation practices; Pre-germinated seeds were sown on puddled paddy field, and water was kept about 2 weeks, followed by drainage after sprouting. The field managements of transplanting system were applied since about one month after seeding.
      (1) Date of seeding; 21st, May.
      (2) Fertilization ;

	Basal	1st T.D.	2nd T.D.	3rd T.D.	4th T.D.
N	40Kg/ha	20Kg/ha	25Kg/ha	25Kg/ha	13Kg/ha
P	60Kg/ha				
K	30Kg/ha				

(1st top dressing was done 20 days after seeding, 2nd 40 days after seeding, 3rd 20 days before heading and 4th at heading).

   8) Investigation Items; Weed species and amount (number and dry weight), Incidences of diseases, Days to heading and maturity, Lodging, Plant height, Panicle length, Yield components and Yield).

4. Summary of results;

1) The treatment of Benthiocarb after puddling before seeding reduced the rice germination ratio, indicating strong plant toxicity with it.

2) On the other hand, the treatment of Benthiocarb after sprouting (7 days after seeding) did not show plant toxicity, and the plots of this treatment (Treatment No.2 and No.5) showed relatively high yields (8.38 t/ha and 8.55 t/ha, respectively).

3) Highest yield has been obtained by the treatment with Pyrazolate before seeding plus Bentazone 30 days after seeding (8.95 t/ha).

4) The effect of Oxadiazon before seeding also seems to be high, and the plots of this treatment (No.2 and No.3) have recorded 220% and 231% of yield increase than control plot.

5) Principal noxious weed in this experiment was Cyperus difformis, which was controlled in all the treatments except control plot. This fact infers the hypothesis that Bentazone may have suppressed this weed, although, it is not clear only from this result.

5. Conclusion;

1) Feasible herbicide combination in direct seeding cultivation system under wet condition would be as follows;

   (1) Oxadiazon (after puddling before seeding) and Bentazone (30 days after seeding).

   (2) Benthiocarb (after sprouting when rice leaf age is around 1.2) and Bentazone (30 days after seeding).

   (3) Pyrazolate (after puddling before seeding) and Bentazone (30 days after seeding).

2) Benthiocarb before seeding seems to bring plant toxicity to rice plant.

3) It is important to pay attention for other field preparations and managements to control annual and perennial weeds, such as crop rotation or water management.

4) The effect of Molinate is not so clear.

Table 1-1 WEED CONTROL EXPERIMENT IN DIRECT SEEDING CULTIVATION METHOD UNDER WET CONDITION, R M S, 1987

No.	TREATMENT: After puddle Before seeding	Just after Sprouting /1	After Sprouting /2	After 30 days	RESULT: Cyperus difformis No./m²	Cyperus difformis W./m² g /3	Echinochloa spp No./m²	Echinochloa spp W./m² g /3	Others weed W./m² g	Total W./m² g /3
1	- -	- -	- -	- -	706.3 a	296.7 a	0 b	0 b	21.2 a	317.9 a
2	Oxadiazon	- -	Benthiocarb	Bentazone	0 b	0 b	0 b	0 b	10.7 a	10.7 b
3	Oxadiazon	- -	- -	Bentazone	0 b	0 b	0 b	0 b	8.4 a	8.4 b
4	Benthiocarb	- -	- -	Bentazone	2 b	0.1 b	0 b	0 b	5.6 a	5.7 b
5	- -	- -	Benthiocarb	Bentazone	33 b	15.1 b	0 b	0 b	30.8 a	45.9 b
6	Benthiocarb	- -	Benthiocarb	Bentazone	0 b	0 b	0 b	0 b	43.8 a	43.8 b
7	- -	- -	Molinate (Ordram) /4	Bentazone	226 b	82.1 b	0 b	0 b	4.4 a	86.5 b
8	Oxadiazon + Butachlor Occult	- -	- -	Bentazone	141.3 b	43.0 b	0 b	0 b	22.5 a	71.5 b
9	No	- -	- -	Bentazone	2.3 b	0.4 b	0.5 b	1.2ab	95.3 a	96.9 b
10	Pyrazolate	- -	- -	Bentazone	0 b	0 b	2.8 a	2.2 a	1.3 a	3.5 b
11	- -	No	- -	Bentazone	84.8 b	31.3 b	0.8 b	0.9 ab	24.5 a	56.7 b
12	- -	Pyrazolate	- -	Bentazone	198 b	70.2 b	0 b	0 b	2.9 a	73.1 b
Av.					116.4	45.4	0.33	0.35	22.6	68.4
C.V.					138.4%	135.4%	396.6%	370.6%	267.6%	130.20 %

Note /1....... 3 days after seeding

/2....... 7 days after seeding

/3....... Dry weight

/4....... 10 days after seeding

Table 1-2 WEED CONTROL EXPERIMENT (D. S. WET CONDITION), RMC, 1987

Treatment No.	Yield /2 t/h	Yield (t/f)	Days to Heading	Days to Maturity	Diseases /1 BL (1-2)	Diseases NBL	Diseases BS	Diseases BL (5)	Lodging %	Plant height (cm)	Panicle length (cm)	No. of grains per panicle	Percentage of maturity	1000 grain weight	No. of panicle/m²
1	3.81	(1.60) d	87	132	-	2	-	-	0	83.4	20.6	93.9	91.8	22.4	528.3
2	8.38	(3.52) ab	87	132	-	2	-	-	21	86.2	21.9	120.1	93.9	22.2	594.0
3	8.80	(3.70) ab	87	133	-	2	-	-	49	85.2	21.3	120.7	91.9	21.7	739.8
4	0.46	(0.19) e	88	134	-		-	-	0	89.8	22.1	134.5	71.7	21.6	40.5
5	8.55	(3.59) ab	87	132	-	2	-	-	41	85.8	21.6	118.9	93.5	21.9	630.0
6	0.72	(0.30) e	88	134	-		-	-	0	89.9	22.3	159.2	81.5	21.2	44.9
7	8.57	(3.60) ab	87	133	-	2	-	-	55	85.7	21.3	120.2	94.1	21.8	581.8
8	7.21	(3.03) abc	87	133	-	2	-	-	15	85.5	20.9	98.8	93.0	22.5	733.8
9	5.48	(2.30) cd	87	132	-	2	-	-	8	90.7	21.8	179.1	66.2	21.2	557.0
10	8.95	(3.76) a	87	132	-	2	-	-	38	85.9	21.6	103.4	94.2	21.9	806.5
11	7.69	(3.23) abc	87	133	-	2	-	-	36	84.4	20.7	99.1	89.3	22.3	712.8
12	6.38	(2.68) bcd	87	133	-	2	-	-	19	81.5	20.8	95.8	89.7	21.6	650.2
Av.	6.25	(2.63)	87.2	132.8	-	-	-	-	-	86.4	21.4	120.3	89.5%	21.9	535.0
Cv.	24.7%									3.91	3.21	21.09%	8.3%	3.61	17.87

Note....... /1 BL(1-2) = Leaf Blast in seedling, BL(5) = Leaf Blast in Heading, NBL=Neck Node Blast

/2 Corrected for 14% of moisture contents

Treatments are same as table 1.

I-3-6 TRIAL ON VARIETY COMPARISON IN DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION

1. Investigators; Mohamed YOUSEF, Hikaru NIKI

2. Objectives ; To test and compare 4 new varieties, Giza 175, Giza 181, Gz 1368 and IR 28, in direct seeding cultivation method under dry condition.

3, Experimental Design and Methods;

1) Design ; Simple trial without repetition

2) Treatments (varieties);

Giza 175
Giza 181
Gz 1368
IR 28

3) Location ; Block A plot No.6

4) Plot area ; 6m x 90m = 540m²

5) Cultivation practices; Seeds were drilled mechanically on dry field (Tye Drill Seeder), and the field was submerged one day. Then intermittent flush water was given whenever necessary until one month after seeding. Some field managements with transplanting system were applied later.

(1) Seeding date; 9th, June

(2) Seed amount ; 130 Kg/ha

(3) Fertilization;

	Basal	1st T.D.	2nd T.D.
N	26 Kg/ha	120 Kg/ha	30 Kg/ha
P	120 Kg/ha		
K	30 Kg/ha		

(4) Weed control;

a. Benthiocarb G. 30 Kg/ha.....16 days after seeding

b. DCPA 7,1 l/ha + Benthiocarb 1,2 l/ha.... 36 days after seeding

6) Investigation Items; Sprouting ratio, Plant height, Panicle length, Dates of heading and maturity, Lodging, Incidences of diseases, Yield components and Yield.

4. Summary of results;

1) The main field was prepared excellently by rotary, and high rate of seedling stands have been obtained (36.5%).
2) On the other hand weed control programme was not appropriate, neither water management. Accordingly, overall plant growth was suppressed, and high yields were not obtained finally.
3) Highest yield was marked by Gz 1368 (5.50 t/ha). The yields of IR 28, Giza 175 and Giza 181 were 5.10 t/ha, 4.69 t/ha and 4.69 t/ha, respectively.
4) Lodging was not observed in any of the varieties. This could be explained by low plant heights due to the poor growth (70cm of Giza 175, 74cm of Giza 181, 79 cm of Gz 1368 and 85cm of IR 28).
5) The figures of the yield components infer that high yields have not been brought mainly because of shortage of number of panicles per unit area.

5. Conclusion;

1) Highest yield has been obtained by Gz 1368. Probably, high ripening ratio (94%) and relatively larger number of spikelets per panicle (134) would have contributed to it.
2) High seedling stand could be achieved by careful land preparation by rotary tillage in direct drill seeding under dry condition.

Table 1. VARIETY TRIAL ON DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION

(R M C 1 9 8 8)

Variety	Sprout Ratio (%)	Days to		Plant Height (cm)	Panicle Length (cm)	Lodg (%)	No. of Panicles per m²	No. of Spiklet per pan	Ripening Ratio (%)	1000 grain weight (g)	Yield (t/ha) (t/f)
		Heading	Mat.								
Giza 175	33	105	142	70	20.8	0	453	124	88	22.4	4.69 (1.97)
Giza 181	46	101	138	74	21.1	0	323	112	92	26.5	4.69 (1.97)
G z 1368	33	99	136	79	20.0	0	374	134	94	24.7	5.50 (2.31)
I R 28	34	104	143	85	21.9	0	339	117	87	24.6	5.10 (2.14)
Average	36.5	102	140	77.0	21.0	0	372	121.8	90.3	24.6	5.00 (2.10)

I-3-7 TRIAL ON EFFECT OF NITROGEN FERTLIZER IN DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION

1. Investigators; Alaa Mohamed EL-SHAMELY, Hikaru NIKI

2. Objectives ; To study optimum Nitrogen amount in drill-seeded cultivation method under dry condition.

3. Experimental Design and Methods;
   1) Design ; Randomized complete block
   2) Treatments; Control, 60 Kg N/ha, 90 Kg N/ha, 120 Kg N/ha and 150 Kg N/ha,
   3) Repetition; 4
   4) Variety ; Giza 175
   5) Location ; R M C A Block No.9 and No. 10
   6) Plot area ; 16m x 20m = $320m^2$
   7) Cultivation practices; Pre-germinated seeds were seeded on dry condition by seed drill (Tye), then the field was submerged one day. Flush water was given when ever the field became over dry until one month after seeding. The field managements of transplanting system were applied since then.

      (1) Seeding date; 23rd, May
      (2) Seed amount ; 130 Kg/ha
      (3) Inter row ; 30cm
      (4) Fertlization;

	Basal	1st T.D.	2nd T.D.	3rd T.D.
N	50%	20%	20%	10%
P	60 Kg/ha			
K	30 Kg/ha			

(1st T.D. took place after germination, 2nd T.D. one month after seeding, and 3rd T.D. 2 weeks before heading)

      (5) Weed control;
         a. Benthiocarb G. 30 Kg/ha.......After germination
         b. DCPA 7 l/ha + Benthiocarb 3.5 l/ha....35 days after seeding.

8) Investigation Items ; Dates of heading and maturity, Lodging, Plant height, Panicle length, Yield compo-- nents and Yield.

4. Summary of results;

1) All managements except weed control were carried out smoothly as the schedule.
2) According to the increase of Nitrogen amount, all figures tended to increase. But, lodging was not observed in any plot.
3) There were significant differences between any of two treatments in investigation items, such as plant height, panicle number per m^2 and grain number per panicle.
4) In yield, there also were significant differences between any of two treatments, except between 150 Kg N/ha and 120 Kg N/ha, and 120 Kg N/ha and 90 Kg N/ha.
5) To the increase of nitrogen amount, the yield respon ded positively.

Table 1. RESULTS OF FERTILIZER TRIAL ON DIRECT SEEDING CULTIVATION METHOD UNDER DRY CONDITION - GIZA 175, RMP, 1987

Treatment (Nitrogen)	Days to Heading	Days to Maturity	Lodg %	Plant height (cm)	Panicle length (cm)	Nos. of Panicle m²	Nos. of spicklets/panicle	1000 grain weight (g)	weight of panicle	Yield Ton/Hec
0 Kg/ha	94	134	0	84.0 e	16.1	290 e	70 e	19.0	1.54	1.99 d
60 Kg/ha	95	135	0	93.1 d	18.0	330 d	100 d	21.0	2.08	5.58 c
90 Kg/ha	96	136	0	101.4 c	19.3	383 c	110 c	22.0	2.25	6.63 b
120 Kg/ha	97	137	0	109.0 b	20.7	406 b	122 b	24.0	2.72	7.32 ab
150 Kg/ha	98	138	0	118.0 a	22.2	586 a	130 a	25.0	3.01	7.88 a
Average	96.0	136.0	0	101.1	19.2	399	106.4	22.2	2.32	5.88
C.V. (%)	-	-	-	2.27	4.83	2.82	3.32	3.18	13.78	4.14

Note.......Values followed by the letter are not significantly different at the 5% level

I-4 ALTERNATIVES IN THE TRANSPLANTING METHOD

I-4-1 TRIAL ON RAISING SEEDLINGS FOR BROADCAST TRANSPLANTING

1. Investigators; Samir KHADRE, Hikaru NIKI
2. Objectives ; To find the best and economical method to raise seedlings for broadcast transplanting. Special seedling tray for broadcast transplanting used to be used previously in R M C, though, they cost much due to non-local products. Some other way for this purpose by local cheap materials were to be searched.
3. Experimental Design and Methods;
   1) Design ; Simple trial in seedbed without repetition
   2) Treatments;
      (1) Special seedling tray for broadcast transplanting (Japanese made, with 578 per tray)
      (2) *Dapog method (Phillipines local method for* raising seedling).
      (3) Dapog method with soil.
      (4) Paper pots (used in Japan, with 800 holes per pot).
   3) Location ; Seedbeds near nethouse site, R M C.
   4) variety ; Nokei No.4
   5) Methods ; Dapog method is the one to raise seedling on surface of banana leaves or plastic sheet placed on ordinary seedbed. Pre-germinated seeds are to be sown on it *with high density just to cover the* surface completely. Then, water is supplied by raising water level of seedbed or by a sprinkling can. Dapog method with soil is just to add some 2 to 3cm thickness of soil on plastic sheet to dapog method. Other methods of raising seedlings with special seedling tray for broadcast transplanting and paper pots are similar to the mechanical transplanting method with ordinary seedling trays.

6) Investigation items; Seedling height, Plant age, Length of leaves and sheaths and dry weight.

4. Summary of results;

1) Relatively healthy seedlings have been obtained in Dapog method with soil (13.8cm of plant height, 3.0 of leaf age, 0.19g of 10 plants dry matter, 1.38mg of dry matter/plant height ratio) (Tab.1)

5. Conclusion;

1) The method of raising seedlings by dapog method with soil could be considered as one of alternatives for small scale farmers.

2) Only small modification of ordinary seedbed and little more materials (Vinyl sheet = $36m^2$/f and seedling cutter) are required for this method, and is as practical as traditional method.

Table 1. TRIAL ON RAISING SEEDLING FOR BROADCAST TRANSPLANTING

Treatment	Date of Seeding	Plant Height (cm)	Leaf length 1st	Leaf length 2nd	Leaf length 3rd	Sheath Len. 1st	Sheath Len. 2nd	Leaf Age	Dry matter g/10 plants	Dry matter/plant height ratio mg/cm
1. Dapog with soil[2)]	6 July	13.8	1.9	4.5	3.4	2.5	3.6	3.0	0.19	1.38
2. Dapog without soil	6 July	7.8	1.7	3.6	-	2.1	3.2	2.6	0.11	1.41
3. Seeding box[3)]	6 July	12.5	1.8	4.6	2.9	1.9	4.0	3.1	0.12	0.96
4. Paper pot	6 July	13.2	1.5	3.9	1.9	2.1	3.9	2.9	0.11	0.83

Notes...........1) Date of measurement; Dapog without soil= 12 days after sowing, others = 23 days after seeding.

2) 10gs of N, P_2O_5 and K_2O were applied per m^2 at the seeding time.

3) Special seedling box for broadcastable seedlings.

I-4-2 EXPERIMENT ON FERTILIZER IN SEEDLING BOX AND SEEDBED, AND SEED AMOUNTS IN SEEDLING BOX TO GET IDEAL INTERMEDIATE SEEDLING

1. Investigators; Samir KHADRE, Hikaru NIKI
2. Objectives ; To seek optimum amount of fertilizer in seedbed as well as in seedling box, and optimum seed amounts per seedling box to get healthy and ideal intermediate seedling.
3. Experimental Design and Methods;
   1) Design; Factorial design, randomized allocation of seedling box on three seedbeds differenciating fertilizer levels.
   2) Treatments;

      a. Seedbed fertilizer (g. ingredient per m^2)

	N	P	K
(1)	0	0	0
(2)	10	0	0
(3)	10	10	10

      b. Fertilizer in seedling box (g. ingredient per box)

	N	P	K
(1)	0	0	0
(2)	2	0	0
(3)	2	2	2

      c. Seed amounts per box

      (1) 80 g/box
      (2) 100g/box
      (3) 120g/box
      (4) 140g/box

3) Repetition; 4 repetitions in treatments of seed amounts and fertilizer amounts in seedling box, and no replication in the one of fertilizer amounts in seedbed.

4) Location; Seedbed near nethouse, R M C.

5) Method ; Followed the raising method for standard rice cultivation system with young seedling and transplanter. Three kinds of treatments described above were applied on those seedbeds and seedling boxes.

(1) Date of seeding; 3rd, July.

6) Investigation Items; Seedling age, Height of seedling, Length of leaves and sheaths and dry matter of seedling.

(1) Date of investigation; 22nd, JUl. and 29th, Jul.

4. Summary of results;

1) As the air temperature rose, seedling growth was accelerated. Therefore, investigations were carried on earlier than scheduled date. The dates of investigations were 19 days and 26 days after seeding and accumulated temperature were 493°C and 680°C, respectively.

2) The increase of dry matters slowed down and stopped in early stage (before 19 days after seeding), although, seedling ages tended to advance till later stage. (Dry matter of seedlings is said to stop increasing at around 400°C of accumulated temperature in Japan).

3) The differences between seed amounts were not clear in any of the characteristics investigated.

4) For fertilizer levels in seedbed, the seedling heights and dry matters of two treatments, 10-0-0g (N-P-K)/m^2 and 10-10-10g (N-P-K)/m^2, exceeded those of control, (Table 3)

5) For fertilizer levels in seedling box, more healthy seedlings were obtained in the treatment, 2-2-2g (N-P-K)/box, followed by 2-0-0g/box and control as the least. The concept of healthy seedling is gained by the total evaluation of dry matter weight and expressed by the dry matter weight/plant height ratio in the unit of mg/cm (Table 3)

5. Conclusion;

1) Optimum seed amount per one box to get ideal intermediate seedlings is not so clear from the experiment, although, considering the recommendations in Japan and experimental results, 120g/box could be appropriate.
2) It seems that more healthy seedlings can be obtained by 10-10-10g (N-P-K)/m^2 of fertilizer in seedbed than 10-0-0 g/m^2, which is better than control.
3) In seedling box, the fertilizer level of 2-2-2g (N-P-K)/box can bring more healthy seedling than 2-0-0g/box, which is better than control.
4) Accumulated temperature determines the duration to get intermediate seedlings, and 650°c to 700°c seems to be required to get complete 4 leaves (about 620°c to 720°c in Japan).
5) However, dry matter/plant height ratio deteriorates then, and from this view point, 3.5 leaves seedling seems to be better than 4 leaves seedling under Egyptian condition.

Table 1.

EXPERIMENT ON FERTILIZER IN SEEDLING BOX AND SEEDBED, AND SEED AMOUNTS IN SEEDLING BOX TO GET IDEAL INTERMEDIATE SEEDLING (22nd, July)

Seed Amount (g/pot)	Fertilizer /1 Seedbed	Seedling Tray	Plant Height (cm)	Leaf length (cm) 1st	2nd	3rd	4th	5th	Sheath length 1st	2nd	3rd	4th	Leaf Age	Dry matter (10 plant)
80	0-0-0	0-0-0	12.2	2.1	5.5	6.8	-	-	2.2	3.5	4.7	-	3.1	0.13
		2-0-0	14.0	2.5	7.2	9.9	-	-	2.6	5.4	7.4	-	3.2	0.18
		2-2-2	14.7	2.3	6.8	8.4	-	-	2.2	4.1	6.2	-	3.3	0.16
	10-0-0	0-0-0	12.7	2.2	5.3	7.5	-	-	2.2	3.7	5.4	-	3.3	0.13
		2-0-0	14.5	2.4	7.2	10.3	-	-	2.6	4.7	6.9	-	3.5	0.16
		2-2-2	16.2	2.3	5.8	8.1	-	-	2.2	4.4	6.4	-	3.8	0.20
	10-10-10	0-0-0	13.4	2.1	5.2	7.5	-	-	2.2	3.8	5.7	-	3.4	0.19
		2-0-0	14.0	2.8	6.9	11.5	-	-	3.0	4.8	6.7	-	3.5	0.17
		2-2-2	14.4	2.2	6.5	7.6	-	-	2.2	3.8	5.8	-	3.3	0.18
100	0-0-0	0-0-0	11.5	2.1	5.0	6.4	-	-	2.2	3.8	5.1	-	3.1	0.14
		2-0-0	13.6	2.4	6.8	8.2	-	-	2.2	4.3	6.0	-	3.2	0.19
		2-2-2	13.5	2.6	5.9	8.4	-	-	2.3	3.8	5.9	-	3.3	0.15
	10-0-0	0-0-0	14.9	2.1	0.1	8.1	-	-	2.2	3.9	6.5	-	3.2	0.17
		2-0-0	15.3	2.3	7.1	10.3	-	-	2.4	4.6	7.1	-	3.3	0.17
		2-2-2	16.1	2.1	6.2	10.4	-	-	2.2	3.9	6.6	-	3.2	0.16
	10-10-10	0-0-0	14.9	2.3	6.1	8.3	-	-	2.1	3.8	5.9	-	3.3	0.15
		2-0-0	14.3	2.2	6.8	8.2	-	-	2.4	4.4	6.1	-	3.2	0.13
		2-2-2	14.4	2.2	6.5	7.9	-	-	2.2	3.9	6.1	-	3.8	0.15
120	0-0-0	0-0-0	11.0	1.9	5.1	6.2	-	-	2.0	3.1	4.0	-	3.1	0.16
		2-0-0	13.2	2.2	5.9	7.5	-	-	2.2	3.8	5.9	-	3.5	0.15
		2-2-2	13.0	7.8	5.3	6.3	-	-	2.0	3.3	4.9	-	3.9	0.16
	10-0-0	0-0-0	15.3	2.1	4.8	7.8	-	-	2.2	4.2	6.7	-	3.5	0.15
		2-0-0	15.3	2.2	6.6	8.6	-	-	2.2	4.1	6.6	-	3.8	0.19
		2-2-2	16.1	2.1	6.0	8.2	-	-	2.1	3.7	5.9	-	3.7	0.20
	10-10-10	0-0-0	14.0	2.0	5.0	7.0	-	-	2.0	3.3	5.0	-	3.6	0.19
		2-0-0	14.3	2.3	6.6	9.0	-	-	2.3	4.2	6.8	-	3.4	0.15
		2-2-2	13.5	2.2	6.1	6.5	-	-	2.1	3.0	4.5	-	4.0	0.22
140	0-0-0	0-0-0	11.5	2.1	5.0	6.9	-	-	2.0	3.6	5.1	-	3.2	0.15
		2-0-0	12.0	1.9	5.7	6.6	-	-	2.0	3.5	5.2	-	3.4	0.18
		2-2-2	13.7	2.2	5.9	7.6	-	-	2.1	3.3	5.0	-	3.7	0.15
	10-0-0	0-0-0	17.1	2.1	5.3	9.2	-	-	2.0	3.5	6.1	-	3.8	0.19
		2-0-0	14.9	2.1	6.4	9.7	-	-	2.1	3.8	6.9	-	3.8	0.20
		2-2-2	16.3	2.2	5.7	7.5	-	-	2.0	3.6	5.7	-	3.8	0.22
	10-10-10	0-0-0	12.9	2.2	5.7	7.7	-	-	2.2	3.6	5.7	-	3.7	0.20
		2-0-0	12.5	2.5	6.7	9.1	-	-	2.3	4.1	6.6	-	3.6	0.21
		2-2-2	12.1	2.1	6.0	6.8	-	-	8.1	3.1	4.2	-	3.8	0.21

Note............/1 Seedbed.............Figures are expressed grams per m² of N-P-K

Seedling tray........Figures are expressed grams per pot of N-P-K

Table 2. **EXPERIMENT ON FERTILIZER IN SEEDLING BOX AND SEEDBED, AND SEED AMOUNTS IN SEEDLING BOX TO GET IDEAL INTERMEDIATE SEEDLING (29th, July)**

Seed Amount (g/pot)	Fertilizer /1		Plant height (cm)	Leaf length (cm)			Sheath length			Leaf Age	Dry Matter (10 plants)
	seedbed	Seedling tray		1st	2nd	3rd	1st	2nd	3rd		
80	0-0-0	0-0-0	13.3	2.2	5.6	7.2	2.2	4.1	5.4	3.2	0.17
		2-0-0	19.3	2.3	6.9	7.9	2.3	3.6	7.4	3.5	0.15
		2-2-2	17.8	2.6	6.7	8.2	2.4	4.0	6.8	3.4	0.18
	10-0-0	0-0-0	16.7	2.5	7.4	7.9	2.3	3.7	7.6	4.0	0.16
		2-0-0	18.2	2.7	6.7	8.1	2.4	4.1	6.9	4.0	0.16
		2-2-2	19.0	2.5	7.1	9.1	2.5	4.5	7.8	3.9	0.19
	10-10-10	0-0-0	15.0	2.6	6.9	9.2	2.5	4.6	8.1	4.0	0.15
		2-0-0	22.7	2.3	7.8	8.9	2.3	5.5	6.6	4.1	0.14
		2-2-2	16.4	2.3	7.2	8.3	2.3	3.4	7.6	3.4	0.15
100	0-0-0	0-0-0	16.0	1.9	7.7	9.6	2.1	4.2	9.2	3.4	0.09
		2-0-0	17.4	2.2	6.1	8.9	2.1	4.2	7.1	3.7	0.15
		2-2-2	18.2	2.2	6.1	9.1	2.1	3.6	6.2	3.6	0.14
	10-0-0	0-0-0	17.7	2.3	7.5	8.5	2.3	3.9	8.9	3.5	0.12
		2-0-0	20.1	2.6	6.8	9.1	2.5	4.1	9.2	4.0	0.14
		2-2-2	21.2	2.5	6.9	10.1	2.6	6.1	8.1	4.1	0.17
	10-10-10	0-0-0	16.1	2.6	7.4	9.7	2.5	4.1	7.1	3.9	0.20
		2-0-0	24.0	2.1	6.7	8.0	2.2	3.4	9.2	4.0	0.13
		2-2-2	18.3	2.4	7.0	6.8	2.1	3.5	6.7	3.3	0.12
120	0-0-0	0-0-0	11.3	2.2	5.9	6.9	2.2	3.4	6.1	3.4	0.16
		2-0-0	17.3	2.5	6.3	8.7	2.1	3.7	6.2	4.0	0.14
		2-2-2	20.1	2.1	6.8	9.1	2.3	5.2	7.3	3.6	0.17
	10-0-0	0-0-0	20.6	2.2	8.2	8.9	2.3	3.6	8.1	4.0	0.18
		2-0-0	16.2	2.1	8.1	9.1	2.6	4.6	8.1	3.9	0.20
		2-2-2	17.1	2.5	9.1	8.1	2.5	6.1	9.1	4.0	0.21
	10-10-10	0-0-0	15.2	2.6	9.9	7.1	2.6	4.6	7.1	4.1	0.20
		2-0-0	22.2	2.2	8.1	9.2	2.2	3.4	7.2	4.4	0.20
		2-2-2	19.9	2.3	6.6	7.2	2.6	3.5	6.7	4.0	0.19
140	0-0-0	0-0-0	16.9	2.1	6.4	8.0	2.1	4.0	5.7	3.4	0.13
		2-0-0	16.7	2.6	6.4	9.3	2.2	4.2	6.6	3.7	0.14
		2-2-2	21.1	2.1	7.5	7.2	2.1	3.2	6.9	3.9	0.12
	10-0-0	0-0-0	19.7	2.7	8.6	9.5	2.3	3.8	7.9	3.8	0.16
		2-0-0	21.6	2.1	8.4	6.9	2.2	3.8	7.7	4.2	0.15
		2-2-2	22.1	2.3	6.7	7.1	2.5	4.0	7.9	4.0	0.20
	10-10-10	0-0-0	24.2	2.4	7.6	8.2	2.8	4.1	9.1	3.9	0.19
		2-0-0	24.2	2.2	7.6	7.2	2.3	4.1	5.3	4.1	0.21
		2-2-2	18.3	3.3	6.0	7.9	2.2	3.5	5.3	4.5	0.20

Note .... /1 Seedbed......... Figures are expressed grams per m² of N-P-K
Seedling Tray... Figures are expressed grams per pot of N-P-K

Table 3. AVERAGE VALUES OF PLANT HEIGHT AND DRY MATTER IN EACH TREATMENT (INTERMEDIATE SEEDLING EXP. R M C 1987)

		22nd July		Dry matter /plant H. Ratio (mg)/cm	29th July		Dry matter/ plant h. ratio (mg)/cm
		Plant Height	Dry Matter /1		Plant Height	Dry matter /1	
Seed amount	80 g	14.0 cm	0.167	1.19	17.6cm	0.160	0.91
	100 g	14.3	0.157	1.10	18.8	0.140	0.74
	120 g	14.0	0.191	1.36	17.8	0.183	1.03
	140 g	13.7	0.190	1.39	20.5	0.167	0.81
Seed bed	0-0-0	12.8	0.158	1.23	17.1	0.145	0.85
	10-0-0	15.4	0.178	1.16	19.0	0.170	0.89
	10-10-10	13.7	0.179	1.31	19.7	0.173	0.88
Seedling box	0-0-0	13.5	0.163	1.21	16.9	0.159	0.94
	2-0-0	14.0	0.173	1.24	20.0	0.159	0.80
	2-2-2	14.5	0.180	1.24	19.1	0.17	0.89

Note.........$/1$ g/10 plants

I-4-3 EXPERIMENT ON PLANT DENSITY AND FERTILIZER IN CULTIVATION METHOD WITH INTERMEDIATE SEEDLING

1. Investigators; Samir KHADRE, Hikaru NIKI

2. Objectives ; To determine the level of optimum plant density and optimum nitrogen amounts in cultivation method with intermediate seedling, which may show different plant growth development in comparison with young seedlings.

3. Experimental Design and Methods;

   1) Design ; Split Plot

   2) Treatments;

      a. Planting density; 20.8/m², 23.8/m² and 27.8/m²

      b. Nitrogen amounts; 60 Kg N/ha, 90 Kg N/ha, 120 Kg N/ha, 150 Kg N/ha

   3) Repetition; 4

   4) Variety ; Giza 175

   5) Location ; R M C BT Block,plot No. 7 and 8

   6) Plot area ; 20m²

   7) Cultivation practices; Intermediate seedlings have been prepared and were transplanted by transplanter (6 rows, Yanmar), being adjusted to 30cm x 12cm, 30cm x 14cm and 30cm x 16cm to obtain above mentioned plant density.

      (1) Seeding date ; 14th, May

      (2) Transplanting date; 20th, Jun.

      (3) Fertilization;

	Basal	1st T.D.	2nd T.D.	3rd T.D.
N	50%	20%	20%	10%
P	80 Kg/ha			
K	30 Kg/ha			

(1st top dressing took place 7 days after transplanting, 2nd one 20 days before heading and 3rd, at heading)

(4) Weed control;

Pyrazolate......... Just after transplanting

8) Investigation Items; Incidences of diseases, Lodging, Dates of heading and maturity, Plant height, Panicle length, Yield components and yield.

4. Summary of results;

1) 37 days seedlings with 5.96 of leaf age and 19.6cm of seedl--ing height were raised.

2) Although there were no significant difference among the treatments in plant density, the results infers that higher yield can be expected with higher plant density (Table 1 - 2).

3) Yield difference by the different amounts of Nitrogen was slight, though, 90 Kg N/ha produced the highest among them.

4) Highest yield was 10.07 t/ha obtained by the treatment of 30cm x 12cm (27.8 plants/m^2) in plant density and 120 Kg N/ha in Nitrogen amounts. (Average yield was 9.52t/ha)

5. Conclusion;

1) It would be infered that maximum plant density, which transplanter could achieve, can bring highest yield in case of intermediate seedling.

2) No definite information was obtained for appropriate nitrogen amount, though, the results suggest the advisability of following the regime for young seedling system.

3) It is assumed that there is no difference in disease incidences by the different levels of plant density and Nitrogen amount.

Table 1-1 DENSITY & FERTILIZER EXP. WITH INTERMEDIATE SEEDLING

Treatment		Days to Heading	Days to Maturity	Diseases /1 BL (1-2)	NBL	BS	BL (5)	Lodg %	Plant height (cm)	Panicle length (cm)	No. of grain/panicle	No. of panicle m²	percentage of maturity %	1000 grain weight (g)	Yield /2 t/ha	Yield /2 (t/t)
30 x 12 cm	60	110	140	1	1	1	1	65	93.3	22.6	145	455	86.5	22.6	10.02	(4.21)
	90	107	141	1	1	1	1	60	98.7	24.3	173	456	88.6	21.1	9.92	(4.17)
	120	110	139	1	1.5	1	1	70	99.3	23.0	150	553	83.7	21.2	10.07	(4.23)
	150	111	140	1	1	1	1	70	94.1	22.3	162	515	83.5	21.2	9.91	(4.17)
30 x 14 cm	60	109	138	1	1	1	1	70	93.0	22.8	160	436	84.4	20.8	9.34	(3.93)
	90	110	141	1	1	1	1	60	96.8	23.4	182	460	87.5	21.0	9.50	(3.99)
	120	107	140	1	1	1	1	65	97.4	23.8	172	375	89.2	20.8	9.35	(3.93)
	150	108	139	1	1	1	1	60	97.2	23.6	159	446	86.4	21.0	9.53	(4.01)
30 x 16 cm	60	111	141	1	1.3	1	1	60	98.5	22.4	151	495	91.2	21.5	8.80	(3.70)
	90	110	138	1	1	1	1	65	94.3	23.1	167	513	87.5	21.2	9.69	(4.07)
	120	110	140	1	1	1	1	70	94.6	23.5	170	503	88.3	20.9	9.12	(3.84)
	150	109	141	1	1	1	1	65	92.4	24.2	143	477	88.5	21.3	8.99	(3.78)
Average		109.3	139.8	1	1.1	1	1	65.5	95.8	23.3	162	476	87	21.3	9.52	
C.V. I									2.6%	2.1%	10.8%	4.3	4.3%	2.4	2.8	
C.V. II									3.6%	4.8%	18.0%	18.3	7.9%	4.3	7.5	

Note.........⁄1 BL(1-2) = Leaf Blast in seedling, BL(5) = Leaf Blast in Heading, NBL = Neck Node Blast

/2 Corrected for 14% of moisture contents

Table 1-2 YIELD TABLE (DENSITY & FERTILIZER EXP. WITH INTERMEDIATE SEEDLING) R M P, 1987

Treatment I /1	Treatment II /2 60 Kg	90 Kg	120 Kg	150 Kg	Average /3 t/ha	(t/t)	
30 x 12 cm	10.2	9.92	10.07	9.91	9.98	(4.19)	a
30 x 14cm	9.34	9.30	9.35	9.53	9.43	(3.96)	a
30 x 16cm	8.80	9.69	9.12	8.99	9.15	(3.84)	a
Average	9.39 a	9.71 a	9.51 a	9.43 a	9.52	(4.00)	

Note.........⁄1 Planting Density

/2 Nitrogen Amount per ha.

/3 Values with same letter are not significantly different at the 5% level

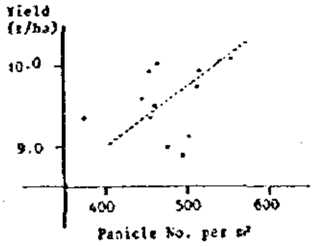


Fig.1 Panicle Number per m² and Yield - Intermediate Seedling Exp. - RMC, 1987

I-4-4 YIELD MAXIMIZING EXPERIMENT

1. Investigators; Mustafa HAMOUDA, Hikaru NIKI
2. Objectives ; There are abundant solar energy in Egypt (highest season, it exceeds 600 cal/cm²/day) which enables rice plants to photosynthesize enough to fill up as high as 60,000 grains per m² (Final Report prepared by former team, Aug. 1986). Although, it is uncertain whether the yield keeps going up or not when these product receptacles, number of grains, increase. The determina-- tion is the motive and objective of current experiment.
3. Experimental Design and Methods;
   1) Design ; Split plot
   2) Treatments;
      a. Plant density; 30 x 13cm (25.6 p/m²), 30 x 11cm (30 p/m²)
      b. Nitrogen amount; 145 Kg N/ha, 165 Kg N/ha, 185 Kg N/ha, 205 Kg N/ha
   3) Repetition; 4
   4) Plot area ; 27 m²
   5) Location ; BT Block No.5 plot
   6) Variety ; Giza 175
   7) Cultivation practices; The cultivation method followed the standard rice cultivation system with young seedling and transplanter, except transplanting, which was done manually. Besides nitrogen fertilizer as treatment, 150 Kg/ha of P_2O_5 and 80 Kg/ha of K_2O were applied as basal fertilizers.

      (1) Application of nitrogen;

Treat. No.	Basal	1st T.D.	2nd T.D.
1	80 Kg/ha	20 Kg/ha	45 Kg/ha
2	100 Kg/ha	20 Kg/ha	45 Kg/ha
3	120 Kg/ha	20 Kg/ha	45 Kg/ha
4	140 Kg/ha	20 Kg/ha	45 Kg/ha

      (1st top dressing is 10 days after transplanting and 2nd is 15 days before heading).

      (2) Date of seeding; 14th, May.

      (3) Date of transplanting; 14th, Jun.

      (4) Weed control;

      Pyrazolate............ Just after transplanting.

   8) Investigation Items; Incidences of disease, Lodging, Dates of heading and maturity, Plant height, Panicle length, Yield components and yield.

4. Summary of results;

1) Most of the cultural practices were carried as scheduled except hand weed control, which was done behind appropriate time.
2) Maximum yield was obtained in the treatment of 30cmx11cm plant density with 205 Kg/ha of nitrogen fertilizer, being 12.73 t/ha (Average yield was 11.47 t/ha).
3) Increase of yield seems to have been brought mainly by the increase of number of panicles per m^2 (Fig. 1).
4) Yield tends to increase above 200 Kg/ha of nitrogen application (Fig. 2).
5) No clear difference has been observed between two plant density (Fig. 3).
6) Quite a high rate of lodging was recorded (73.4% in average).

5. Conclusion;

1) The potentiality of rice production in Egyptian condition seems to be greater than what the Egyptian farmers are producing.
2) The increase of yield receptacles may give higher opportunity to higher yield.
3) Giza 175 tends to lodge extremely with the use of high nitrogen application.

Table 1. RESULTS (YIELD MAXIMIZING EXPERIMENT)

Treatment /3	Days to Heading	Days to Maturity	Diseases BS	NB	BL (1-2)	BL (5)	Lodging %	Plant height (cm)	Panicle length (cm)	Ripening ratio (%)	Nos. of grains per panicle	Nos. of panicles/m²	1000 grains weight (g)	Yield /2 (t/ha)	(t/f)
30cm x 13cm															
80 KgN/ha	106	144	1	1.5	1	1	78.8	98.8	22.2	94.2	163.4	502.1	21.56	11.0	(4.62)
100 KgN/ha	106	148	1	1	1	1	75.0	95.5	22.3	92.6	163.3	513.0	21.63	11.8	(4.96)
120 KgN/ha	106	148	1	1	1	1	72.5	96.5	23.0	93.3	169.9	523.4	21.36	11.6	(4.88)
140 KgN/ha	106	148	1	1	1	1	77.5	97.8	23.3	93.7	168.9	593.3	20.15	12.1	(5.09)
30cm x 11cm															
80 KgN/ha	106	148	1	1.2	1	1	66.2	94.1	22.8	94.5	139.8	542.1	21.91	11.4	(4.79)
100 KgN/ha	106	148	1	1	1	1	72.5	94.8	23.0	94.9	160.5	534.6	21.52	10.6	(4.46)
120 KgN/ha	106	148	1	1	1	1	73.7	95.7	23.3	92.2	158.3	558.4	21.69	11.6	(4.88)
140 KgN/ha	106	148	1	1	1	1	71.2	95.1	23.1	96.1	161.3	573.8	21.82	11.9	(4.99)
Average	106	148	1	1.1	1	1	73.4	95.8	23.0	93.9	160.7	542.6	21.46	11.42	(4.82)
C V %	-	-	-	-	-	-	-	86%	1.02%	3.76%	5.54	8.83	3.53%	3.03%	

Note............../1 BL(1-2) = Leaf Blast in seedling, BL(5)=Leaf Blast in Heading, NBL=Neck Node Blast

/2 Corrected for 14% of moisture contents

/3 Basal Nitrogen (150 Kg P/ha and 80 Kg K/ha for basal fertilizer, and 65 KgN/ha of top-dressing)

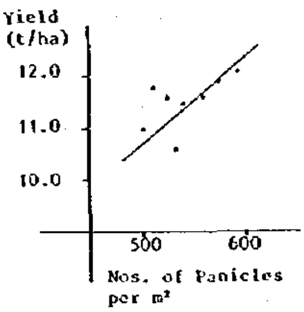


Fig.1 Nos. of Panicles and Yield
(Yield Maximizing Exp.)

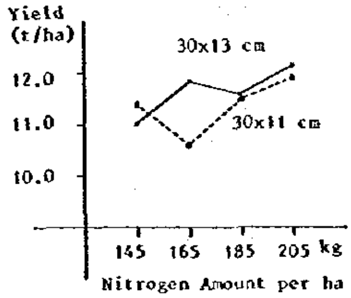


Fig.2 Nitrogen Amount and Yield
(Yield Maximizing Exp.)

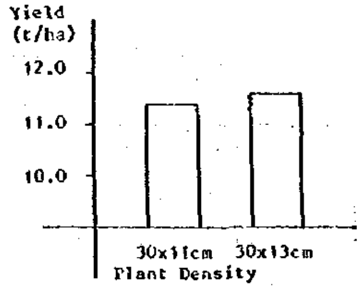


Fig.3 Plant Density and Yield
(Yield Maximizing Exp.)

I-4-5 PERFORMANCE ASSESSMENTS OF RICE TRANSPLANTER FOR IN-TRAY-RAISED MATTED SEEDLINGS

Investigators: Essam Ghazy, Assar Mohamed, I. Matsumoto

Objectives: To assess the operating accuracy and capacity of 4-row rice translpanter

Experimental design and procedures:

1.*Equipment tested and preparation procedures for seedlings and planting bed;*

4-row rice walking type transplanter, model Y P-4000. 200 grams of dry seeds of the Variety, Giza-175 were sown on each of the standard plastic seedling trays 20 days before planting.
The test plots were prepared first by chiseling 2 times and 2 times of rotary tilling, followed by puddling with power driven rotary puddler.
Transplanting was executed on 27th of June '87.

2.*Experimental area:* 4126.34 m^2, block A, plot No. 3, R.M.C. farm.

3.*Items of measurement:*

1) Before transplanting operation.

(1) Seedling conditions; plant height, leaf age, sowing rate per tray, plant establishment density(plants per cm^2).

(2) Field conditions; Water depth, hard pan depth, penetrating depth of falling cone-plumb to record the consistency of field surface, hardpan resistance by penetrometer, field area, travel reduction rate.

2) During transplanting operation;
Time-study factors: Actual transplanting time, turning time, feeding time, adjusting time, travelling speed, travel reduction or wheel slippage, all measured by recording the time segments(lap time) for individual operations.

3) After transplanting operation.
Operational accuracy factors; frequencies of missing or floating hills, number of plants per hill, row space, hill space within row, transplanting area, headland area.

Summary of Experimental results

1. The qualities of seedlings used in this experiment were found to be appropriate for our purpose, with plant height at 11.6 cm, leaf age 2.3, sowing rate 200 g. per tray, seedling establishment density at 4.4

plants per cm^2.

2. The field conditions were also found to be suitable for the operation. Water depth was 2.6 cm, hardpan depth, 25.8 cm, the penetration depth of falling cone-plumb, 9.7, hardpan penetrometer resistance as 2.6 Kg/cm^2, wheel slippage ratio 16.2 %.
3. Table 1 shows time elements of the performance. The net working efficiency, i. e., the actual effective operating time ratio, turned out to be 68 %, with the remaining time consumed for auxiliary activities, such as, turning at the headland, 4.10 %, feeding with seedling mats, 29.23 %, adjusting or miscellaneous jobs, 4.74 %.
   The uncommonly high figure for feeding time can be attributable to the particular adjustment of the planting rate, 90 hills / 3.3 m^2(hill spacing 12 cm), with the finger configuration for slicing out hill blocks of the size, 14 mm horizontal and 14 mm vertical. Theoretically, the adjustment required the feeding at every 110 m of the machine travel. Actual requirements should be at a shorter distance, because of the slippage and incidental losses, magnifying the time spent for feeding. It is needless to say that a higher operating efficiency can be achieved through ensuring to prepare high quality and uniform seedlings and suitable field conditions.
4. Table 2 shows measured parameters indicating the planting accuracy, which is to be judged as relatively successful owing to favorable operating conditions, with total missing hill ratio at 6 %.
5. General observation indicated that the operator was inclined to show physical exhaustion as a result of handling this type of transplanter. The theoretical minimum travel distance needed to be walked to cover one feddan(4200 m^2) is calculated to be 3500 m.

Conclusion and discussions

The tested 4-row transplanter proved to be used efficiently, provided the operating conditions are prepared satisfactorily. However, the amount of physical exertion demanded of the operator walking a long distance under difficult conditions of muddy and deep ground seems to be excessive.

In the actual application, considerations should be duely made to provide the main operator with an assistant to relieve him whenever the former feels exhausted during the daylong hard labor, which requires, besides physical exertion, careful application of skills and alertness to achieve a satisfactory standard of operational quality and efficiency.

WORKING EFFICIENCY
FOR RICE TRANSPLANTER (4-ROW)

Table (1)

Actual transplanting time			Turning time		Feeding time		Adjusting time & others		Working speed m/ec	Working efficiency %	Working capacity FE/hr
hr	min	sec	min	sec	min	sec	min	sec			
1	40	23	6	39	47	23	7	41	0.32/sec	68	0.36

PLANTING ACCURACY

Table (2)

Distance between hill(cm)	Number of plants per hill(plant)	Distance between rows (cm)	Planting depth (cm)	Rate of missing hill (%)	Rate of floating hill(%)
15.1	7.2	31	3.3	5	1

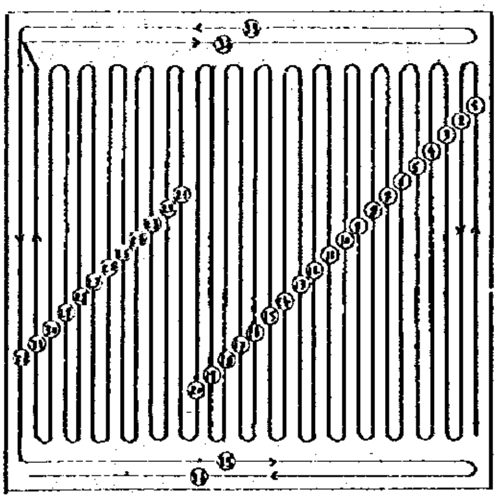
5-10 Survey sheet for operating method

Name of machine & type: TP 400 .... Surveyor ________

Date of test 27/6/87 Recorder Essam & Asser

Location of test R.M.C Field

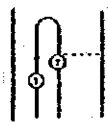
	H	Min	Sec
Work starting time (A)	10	30	--- AM
Work ending time (B)	12	12	6
Working time (B) - (A)	2	42	6



Remarks :

1. Fill the running number in ○ and mark the arrow indicating the operating direction.
2. Note the turning trace.

Example



Kind of machine / Survey items	4 row walking type	6 row riding type	8 row riding type	Remarks
Operation time	(*31 + **4)	(21 + 4)	(16 + 4)	* No,of working line for lengthwise
Time of adjustment in the field	12^m41^s	4^m37^s	6^m18^s	** No,of working line for sideways
Feeding time of seedling by labor	26^m04^s	29^m05^s	40^m31^s	s = second m = minute
Actual time of transplanting	$1^h28^m22^s$	$1^h15^m23^s$	40^m03^s	h = hour
Turning time	11^m38^s	08^m42^s	07^m57^s	
Feeding time by operator	05^m03^s	09^m46^s	07^m22^s	Working speed (20 m distance)
Fueling time in the field	0	0	0	4 row 34 sec, 6 row 35 sec,
Adjusting time for trouble	02^m27^s	05^m26^s	03^m00^s	8 row 31 sec,
No,of consumed seedling box	(.89)	(99)	(95)	
Total working hour	$2^h26^m15^s$	$2^h12^m59^s$	$1^h45^m11^s$	
Size of field width x length (m)	40 x 100	39 x 99	39 x 99	
Working field efficiency	64.6 %	47.2 %	39.6 %	Actual working area/H ÷ Theoretical working area/H
Adjustment of planting condision	70,10x14	70,10x14	70,10x14	
Slip ratio of transplanter				
Fuel consumption	2.6	3.4	2.9	Litter
Field depth	21	21	20	cm

July 1984.
Rice Mechanization Center

Dr. Essam Gazy & Azar Mohamed Azar

I-5 COPING WITH CONSTRAINTS

I-5-1 SOIL SALINITY EXPERIMENT

1. Investigators; Mustafa ESSEA, Hikaru NIKI
2. Objectives ;
   1) To compare growth retardation after transplanting in two kinds of soils, Saline and Sodic.
   2) To study the effect of gypsum to minimize growth retardation in both types of soil.
   3) To reconfirm the hypothesis that a higher dose of nitrogenous fertilizer gives to rice plant the tolerance to salinity damage in saline soil.
   4) To compare three kinds of seedlings for salinity tolerance.

3. Experimental Design and Methods;

Three experiment were carried out by use of Wagners' pot 1/5000a and 1/2000a in nethouse, RMC. Two types of soils used in these experiments as following;

No.	Type of soil	E.C mmh/cm	P.H.	Concentration of Salt (p pm)
I	Sodic	0.91	8.1	582.4
II	Saline	1.46	8.1	934.4

1) First Experiment
   (1) Treatments;
      a. Gypsum amount........... 2 t/f, 4 t/f and control
      b. Seedling age............ 2 to 2.5, 4 to 4.5 and 6.0
      c. Soil.................... Sodic soil in R M C and Saline soil from Serw State Farm.
   (2) Repetition; 2
   (3) Methods; Seedlings were raised in three different times with three different amounts of seeds per seedling box to transplant three kinds of seedlings at the same time.Seed amounts per box were 200g, 100g and 50g to get seedlings with leaf ages of 2 - 2.5, 4 - 4.5 and 6.0, respectively.
   (4) Investigation Items; Dead plant ratio, dry matter of surviving plants.
2) Second Experiment; Repetition of first experiment.

3) Third Experiment;

(1) Treatments;

a. Flushing water; 3 times, 6 times and control before transplanting.

b. Nitrogen amount; 1 N (60 Kg N/ha) and 2 N (120 Kg N/ha).

c. Seedling age; 2.5 to 3.0 and 4.0 to 4.5

(2) Repetition; 2

(3) Methods; Saline soil from Serw State Farm was used. Flushing water treatment is a way to wash out salinity by water drainage after one day submergence with 5cm depth. Nitrogen was applied in the form of Urea (44% of Nitrogen).

(4) Investigation Items; Dead plant ratio, Plant height and dry matter.

4. Summary of results;

1) High dead plant ratios were recorded in Exp. 1 and Exp. 2, probably due to the lack of flushing water.

2) Exp. 3 was carried out in November and December when air temperature went down, and seedbed was covered by vinyl sheet, nevertheless, the growth speed became retarded after 7 weeks from transplanting (Fig. 3).

3) There seems to be more transplanting damage in saline soil than in sodic soil.

4) The effect of gypsum to minimize the planting damage seems to be more notable in sodic soil than in saline soil (Tab.1 and Fig.1).

5) The dead plant ratio of young seedling (2.0 to 2.5 of leaf age) is extremely higher than the ones of intermediate seedling (4.0 to 4.5 of leaf age) and normal seedling for hand transplanting (6.0 of leaf age), (Tab. 1 and Fig. 1).

6) The effect of flushing water to wash out salinity from soil seems to be realized in dry matter weight, but not in plant height (Tabs. 2 and 3).

7) It could be clarified in Exp. 3 whether double dose of nitrogen fertilizer could raise marginal salinity concentration for rice plant growth or not. Although, the phenomena to minimize salinity damage were confirmed.

5. Conclusion;

1) The effect of gypsum could be expected in sodic soil, but not in saline soil.

2) Young seedling with leaf age of 2 to 2.5 is more susceptible to planting damage than intermediate seedling (4.0 to 4.5 of leaf age) or normal seedling (6.0 of leaf age) in both sodic and saline soil.

3) It can be assumed that double dose of nitrogen · amount reduces salinity damage; though, repetition of this experiment is essential to conclude it.

6. Future subject;

Since there are a lot of areas affected by soil salinity in Nile Delta, further experiments on salinity damage would be beneficial, especially one in local site with salinity, such as Serw State Farm.

Table 1 RESULTS OF SOIL SALINITY EXPERIMENTS No.I & II, RHP, 1987

TREATMENTS			Dead plant No. per 12 plants		Dry matter
I. Soil type	II. Gypsum amount	III. Leaf age	Exp. No. I /1	Exp. No. II /2	Per plant(g) /2
Sodic soil /3	0 t/f	2-2.5	9	11	0.09
		4-4.5	6	11	0.12
		6-6.5	3	9	0.77
	2 t/f	2-2.5	9	9	0.10
		4-4.5	1	4	0.30
		6-6.5	3	2[1]	0.71
	4 t/f	2-2.5	12	12	-
		4-4.5	4	6	0.31
		6-6.5	2	5	0.70
Saline soil /4	0 t/f	2-2.5	12	12	-
		4-4.5	4	12	-
		6-6.5	1	10	0.60
	2 t/f	2-2.5	12	12	-
		4-4.5	2	12	-
		6-6.5	3	12	-
	4 t/f	2-2.5	10	12	-
		4-4.5	7	12	-
		6-6.5	2	12	-

/1 After 12 days from transplanting (29. July)

/2 After 30 days from transplanting (10, September)

/3 Soil from RMC, Meet El-Dyba.......Ec = 0.91 mmh/cm, PH = 8.1

/4 Soil from Serw State Farm........Ec = 1.46 mmh/cm, PH = 8.1

Table 2. RESULT OF INVESTIGATION AFTER 2 WEEKS FROM TRANSPLANTING (YOUNG SEEDLING, EXP. No.3 RMC, 1987)

1. Water Flush/1	2. Nitrogen/2	Plant Height (cm)	Dry Weight (10 plants) (g)
0 Time	1 N	23.9	0.32
	2 N	26.1	0.49
	Ave.	25.0	0.41
3 Times	1 N	26.2	0.41
	2 N	25.4	0.39
	Ave.	25.8	0.40
6 Times	1 N	24.8	0.40
	2 N	24.3	0.51
	Ave.	24.6	0.46
Average	1 N	25.0	0.38
	2 N	25.3	0.46
Total Average		25.1	0.42

Note /1......Irrigation one day and drain next day

/2 ......1=Normal doses (60Kg N/ha), 2=Double doses (120 Kg N/ha)

Table 3. TRANSITION OF PLANT HEIGHT (YOUNG SEEDLING, EXP. No.3 RMC, 1987)

1. Water Flush	2. Nitrogen	WEEKS FROM TRANSPLANTING 2	3	4	5	6	7	Dry W./1
0	1 N	23.9	34.4	46.7	52.7	56.0	56.0	3.2
	2 N	26.1	31.7	44.2	54.8	56.5	56.9	3.0
	Ave.	25.0	33.1	45.5	53.8	56.3	56.5	3.1
3	1 N	26.2	35.3	47.8	50.5	54.2	54.2	3.0
	2 N	25.4	29.7	40.5	49.2	53.5	51.7	3.4
	Ave.	25.8	32.5	44.2	49.9	53.9	54.5	3.2
6	1 N	24.8	36.3	47.8	50.6	55.5	55.9	3.9
	2 N	24.3	32.3	48.2	60.3	60.5	61.9	4.2
	Ave.	24.6	34.3	48.0	55.5	58.0	58.9	4.1
Ave.	1 N	25.0	35.3	47.4	51.3	55.2	55.4	3.37
	2 N	25.3	31.2	44.3	45.8	56.8	57.8	3.53
Total Average		25.1	33.3	45.9	53.0	56.0	56.6	3.45

/1....(g) per 10 plants (0.24g at the time of transplanting on 7th, Nov.)

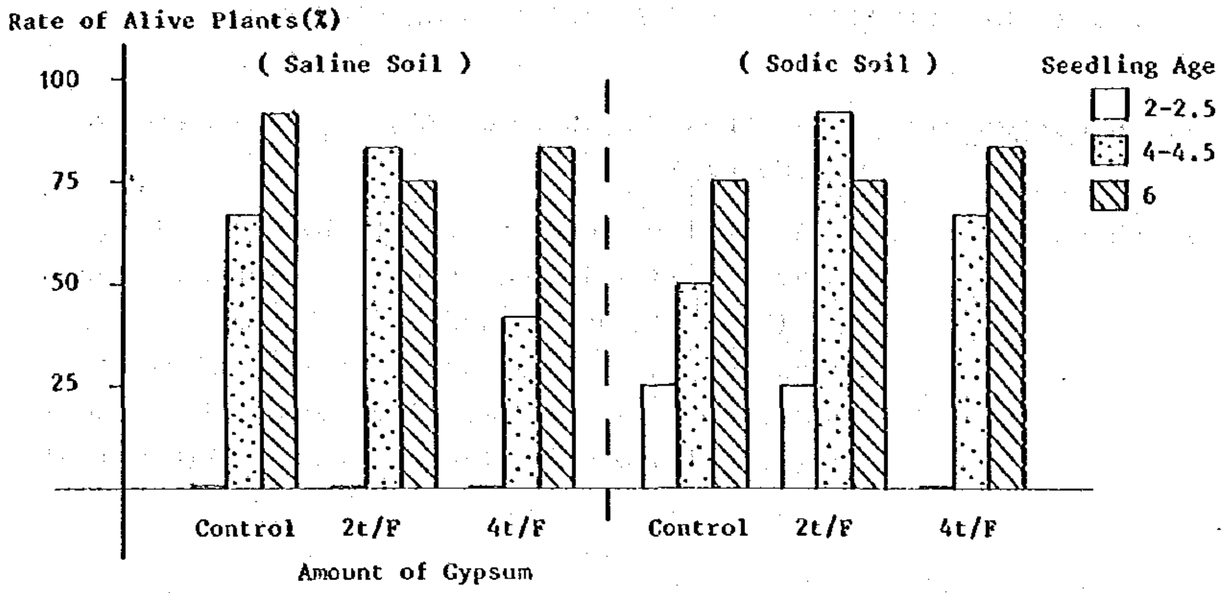


Fig.1 Survival Ratio of Seedling (Soil Salinity Exp. No. 1,) RMC, 1987

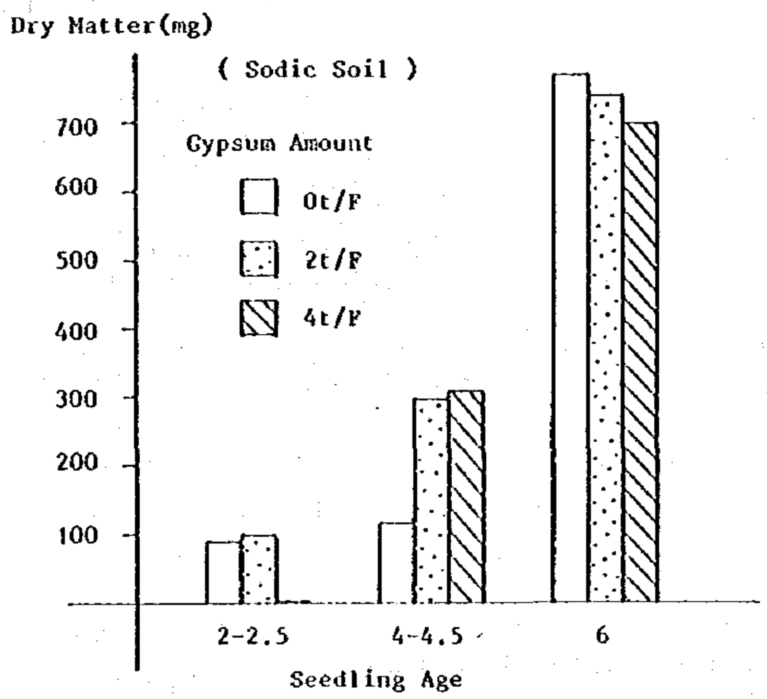


Fig.2 Dry Matter of Plant one month after transplanting (Soil Salinity Exp. No. 2), RMC, 1987

I-5-2 EXPERIMENT ON CHEMICAL CONTROL OF RICE BLAST

1. Investigators; Fathy EL-NEMR, Mohamed YOUSEF, Osamu HORINO, Hikaru NIKI

2. Objectives ; To determine the effects of three new fungicides for rice blast, i.e. Isoprothiolane 12% (Fuji 1), Probenazole 8% (Oryzemate) and Futhalide 2.5% + Neo-asozin 0.4% (Rabcide) , in comparison with existing fungicides, such as Trycyclazole 20% (Beam), EDDP 30%(Hinosan) and IBP 17% (Kitazin).

3. Experimental Design and Methods;
   1) Design ; Randomized complete block
   2) Treatments;

No.	Ingredients	Concentrate	Comercial Name	Chemical Form	Dosage (/10a)
1	Control	------	-----	-----	-----
2	Tricyclazole	20%	Beam	W.P.	30g
3	Isoprothiolane	12%	Fuji 1	Granule	3Kg
4	EDDP	30%	Hinosan	E.C.	100ml
5	IBP	17%	Kitazin	Granule	3Kg
6	Futhalide +	2.5% +	Rabcide	Powder	3Kg
	Neo-Asozin	0.4%	Neoaso	D.L.	
7	Probenazole	8%	Oryzemate	Granule	3Kg

(W.P. is wettable powder, E.C. is Emulsifiable concentrate)

3) Repetition ; 3
4) Variety ; Giza 172
5) Location ; BT Block No.9 plot, R M C
6) Plot area ; 3m x 7m = $21m^2$
7) Cultivation practices; Standard cultivation system with young seedling and transplanter has been applied for this experiment, but, transplanting was carried out behind the normal date so that more rice blast disease could be expected.

(1) Date of transplanting; 23rd, Jun.

(2) Fertilization;

	Basal	1st T.D.	2nd T.D.	3rd T.D.
N	110 Kg/ha	32 Kg/ha	32 Kg/ha	32 Kg/ha
P	160 Kg/ha			

(1st, 2nd and 3rd T.D. are 2.4 and 6 weeks after transplanting, respectively)

(3) Date of fungicides application; 26th, Aug.

8) Investigations; Ten hills from each plot were sam-- pled and scored for number of blast lesions on leaf, neck blast and rachis blast. Lesion number of leaf blast was recorded for only uppermost 2 leaves of each tiller (Flag leaf and leaf under flag leaf). The damage of rachis blast was evaluated as 10% of that of neck blast and were summed up for analysis.

4. Summary of results;

1) All chemicals had clear effects compared to control plot with significant differences (95% level).
2) Futhalide 2.5% seems to have more effect than EDDP 30% for controlling leaf blast.
3) There seems to be no clear effects of IBP 17%, Futha lide 2.5% + Neo-asozin 0.4%, Isoprothiolane 12½, against neck blast by comparison to control.
4) Clear effect was observed in the treatment of Pro-- benzole 8% (there were significant differences with any other chemicals except Tricyclazole 20%).

5. Conclusion;

1) Probenazole 8% seems to have excellent protective power against neck blast.

6. Future subject;

Repetition of the experiment, especially for leaf blast, would be beneficial for the project.

Table 1 Protective effect of the some chemicals against rice blast in the paddy field*
(Rice Mechanization Center, 1987)

Treatment	Block	Number of Leaf blast		Number of Neck blast		Degree of damage by panicle blast**	
1. Control	1	18		30		50.5	
	2	18		41		61.1	
	3	12		59		77.2	
	Average	16.0	a	44.0	a	62.9	ab
2. Tricyclazole 20% W.P. 1000 T	1	5		26		35.3	
	2	4		47		59.2	
	3	4		27		38.5	
	Average	4.3	bc	33.3	ab	43.3	bc
3. Isoprothiolane 12% Granule 3 kg/10a	1	1		41		66.7	
	2	16		30		65.0	
	3	3		24		49.2	
	Average	7.3	bc	31.7	ab	57.0	ab
4. EDDP 30% E.C., 1000 T	1	6		45		63.7	
	2	11		29		46.9	
	3	10		32		46.7	
	Average	9.0	b	35.3	ab	52.4	ab
5. IBP 17% Granule 3 kg/10a	1	8		41		76.2	
	2	8		43		73.4	
	3	6		32		53.5	
	Average	7.3	bc	38.7	ab	67.0	a
6. Futhalide 2.5% + Neo-asozin 0.4% Powder DL 3 kg/10a	1	2		52		70.3	
	2	3		38		51.0	
	3	1		59		68.5	
	Average	2.0	c	49.7	a	63.9	ab
7. Probenazole 8% Granule 3 kg/10a	1	4		16		20.9	
	2	5		17		29.1	
	3	6		26		34.4	
	Average	5.0	bc	19.7	b	28.1	c
Total average		7.2		36.0		54.5	
CV		40.06%		29.35%		21.08%	

* Degree of damage by panicle blast was calculated the total damage of neck blast and rachis blast.
** The figure indicates the number of leaf blast lesion and neck blast per 10 hills, respectively.

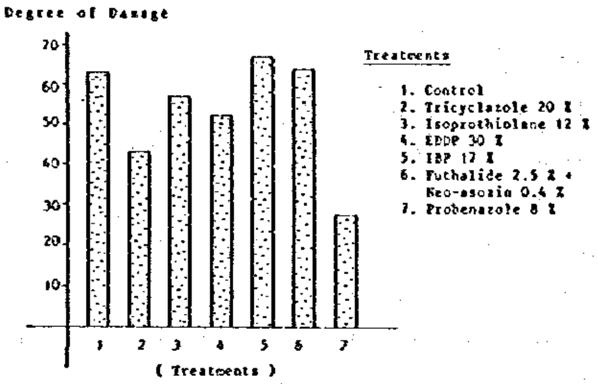


Fig.1 Difference of Chemical Effects against Neck Blast -RMC,1987-

* Degree of damage is the total figure of neck blast and rachis branch blast lesions per 10 plants.

I-6 PRELIMINARY TRIALS ON THE ESTABLISHMENT OF MECHANIZED DIRECT SEEDING CULTIVATION SYSTEM PRACTICAL SCALE EXPERIMENTS

I-6-1 COMPARISON OF TENTATIVE FOUR (4) SYSTEMS

1. Investigators; SHAWKY, Iwao MATSUMOTO, and Tomizo KATO.
2. Objectives ; To survey the differences of tentative four (4) systems on seedling establishment, rice growth and yield.
3. Experimental Design and Procedures;
   1) Design; The four (4) systems and their factors were tested as listed below.

No.	Name of system	Seed rate (Kg/f.) Amount of Calper	Seed rate (Kg/f.) Amount of Sprout s.	Kinds of Seedbed	Kinds of Seeder	Row distance
1.	Direct seeding under wet field with Calper	20	20	Wet (Submerged)	YANMAR Seeder model YPs 800 (6 row type)	30cm
2.	" without Calper	-	40			
3.	Direct seeding under dry field with Calper	20	20	Dry	Broadcasting by hand	No row
4.	" without Calper	-	40			

4 systems x 1 replication = 4 plots (Block-A, plot No. -7, -8).

Area of each plot; 0.5 feddan approximately (=2000m²)

2) Items to be surveyed:
   (i) Soil clod size of seed bed

(ii) No. of young seedling/30cm x 30cm
(iii) No. of panicle/30cm x 30cm
(iv) Total yield by Combine Harvester

3) Cultivation practice:
(i) Variety; Giza 175, seeding on May 20th, havesting on Oct. 5th.
(ii) Fertilizer application; (Broadcasting by hand)
Basal--------N; 20Kg/f - P_2O_5; 11.6 Kg/f
K_2O; 12.5 Kg/f
Top-dressing: 1st - N; 11.6 Kg/f.
2nd - N; 11.6 Kg/f.

(iii) Management practice:
(A) Harbicide application
1st spray..... (Satan 21 + Stam 21)/f. diluted with water, by power sprayer and swathnozzle, 17 days after seeding.

2nd spray..... (Basagran 1.51 + Satan 31)/f. diluted with 5001 of water, by the same machinery, 30 days after the 1st spray.

(B) Hand weeding: 2 times after the 2nd herbicide spray.

(iv) Operational process on land preparation
① Grazing Egyptian clover
② ③ Chisel plowing (2 times)
④ Rotary plowing ⑤ Disk harrowing
⑥ Levelling by laser plane

4. Summary of results:
1) General progress

Direct seeding system on wet field condition (treatment plot No.1 and 2) was carried out well except some delay of herbicide spray and also slight yield loss by sparrow damage at ripening stage, while other direct seeding systems on dry field condition (No.3 and 4) were canceled due to exceedingly poor germination.

2) Survey on the composition of soil clod size immediately before seeding operation indicates that about 60% of total sampled soil in weight consisted of the fraction of clod size less than 2cm in diameter, and the other 25% of total sampled soil consisted of the soil clods more than 4cm diameter (Fig. -1).

3) Survey on seedling number per unit-area (30cm x 30cm) on June 20th indicates that no difference existed between plot No.1 and 2, but the variation in plot No.2 (without Calper) was larger than that in plot No.1 (with Calper).

On the other hand, the seedling establishment ratio (seedling number / theoretical sown grain number) in plot No.1 (with Calper) was higher than the one in plot No.2 (without Calper), so that the effectiveness of the coated Calper for the betterment of seed germination could be recognized (Fig-2 Table-1).

4) Comparison of panicle number per unit area (30cm x 30cm) at ripening stage between plot No.1 and 2 indicates a higher value for plot No.1 (with Calper) compared to that for plot No.2 (without Calper). Incidentaly its value for plot No.1 was 78 and for plot No.2 was 69 respectively. (Table-1).

5) As for total paddy grain yields harvested by Combine, the yield increased by Calper treatment. The yield of 3.668 ton/f. was recorded for plot No.1, amounting to 116% of control plot No.2. The yield for plot No.2 was 3.285 ton/f. (Table-1).

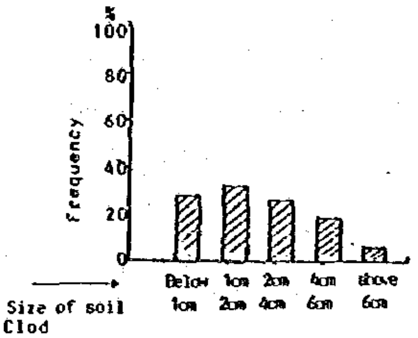


Fig-1. COMPARISON OF SOIL CLOD

(NOTES) SURVEYED ON MAY 21st, WITH 5 SAMPLINGS

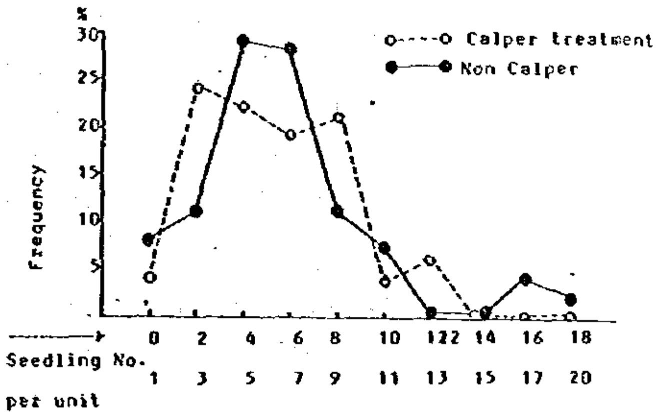


Fig. 2 Frequency distribution of Seedling number per unit area.

Table-1 GROWTH & YIELD

No.	Name of system	Germination ratio*	No. of seedling (30cm x 30cm) Mean	S.D	(max-min)	** Ratio	No. of panicle per 30cmx30cm Mean	S.D	Paddy grain yield Harvested area ①	Yield ②	Calculated yield ③	Calculated*** yield ④
									m²	Kg	Ton/F.	Ton/ha
1.	Direct seeding under wet with Calper		6.0	3.07	(13-1)	27%	78	10.9	1,646	1,438	3.668	8.736
2.	" without Calper	68%	6.0	3.64	(16-1)	14%	69	21.5	1,809	1,415	3.285	7.822
3.	Direct seeding under dry with Calper		**	-	-	-	-	-	-	-	-	-
4.	" without Calper		**	-	-	-	-	-	-	-	-	-

(Notes)

* Marked item shows germination ratio (%) in incubator.

** Marked item shows the establishment ratio of seedling on the field, based upon survey of seedling No. which has 45 samples for each.

*** Calculated yield ④ = yield ② ÷ harvested area ① x 10,000(m²) ÷ 1,000 (Kg)

**** Survey in plot No.3 and No.4 were canceled due to poor germination and also much weed growth.

I-6-2 GROWTH AND YIELD RESPONSES OF DRILL-SEEDED RICE TO SEED RATES UNDER THE MECHANIZED SEEDING ON DRY FIELD CONDITION

1. Investigators: Sabri, Iwao MATSUMOTO, and Tomizo KATO

2. Objectives : To survey the difference of rice seedling establishment, growth and yield among 3 levels of seed rate under drill-seeded condition.

3. Experimental Design and Procedures:
   1) Design :-
      Seed rate: 3 levels (50 Kg/f, 60 Kg/f and 70 Kg/f)
      Soaked seeds were used.

   2) 3 levels of seed rate x 1 replication = 3 treatment plots.
      3 treatment plots (around 720m² each) from Block-A, on field plot No.11 were used.

   3) Items to be surveyed :-
      (i) Composition of soil clod size.
      (ii) Seedling establishment ratio.
      (iii) Panicle number per unit area.
      (iv) Status of weed growth.
      (v) Yield components and total paddy grain yield by combine, etc.

   4) Cultivation practice:
      (i) Variety; Giza 175, seeded on June 2nd by using USA-made grain drill seeder (model;TYE) with 15cm-row distance.

      (ii) Fertilizer application; (broadcasting by hand)
      Basal........ Ammonium Sulphate 100Kg/f, Super phosfate 150Kg/f, Ammonium Potassium 25Kg/f.
      1st top-dressing.... Urea 25Kg/f (June 23rd)
      2nd top-dressing.... Urea 25Kg/f (July 7th)

(iii) Management practice:

(A) Herbicide application

1st Saturn granular 12Kg/f (June 20th) by hand.

2nd (Basagran 1.5l + Saturn 3l)/f.(July 12th) by using power-sprayer with Swathozzle.

(B) Hand weeding 1st - Aug. 5th, 2nd - Aug. 25th.

(C) Irrigation practice

The first flooding irrigation was taken on the 2nd of June immediately after seeding operation finished. For the first 45 days since the first flooding irrigation, the same flooding method was followed whenever the soil surface got slightly dry. After that, standard irrigation and drainage alternating at every 4 days intervals lasted until the early ripening stage of rice.

(iv) Operational process on land preparation

① Grazing Egyptian clover ② , ③Chisel plowing (2 times) ④ Rotary plowing ⑤ Disk harrowing ⑥ Levelling by laser plane.

4. Summary of results:

1) General progress

The whole process went on in satisfactory manners except the following two points; where

(i) Poor germination in the field

(ii) Slight damage by sparrow eating at the ripening stage of rice.

2) As for the composition of soil clod size on seeding bed, the soil clods of less than 2cm in diameter constituted about 50% of total soil sample in weight unit, and the clods of more than 4cm in diameter made up about 15% of the seedbed (Fig-1).

3) Measurements of seedling number/30cm x 30cm and its variation indicate that there existed no wide difference among seed rates of 3 levels given. Seedling number ranged between 8 - 9 per 30cm x 30cm in average value. As for the maximum number of seedlings for 30cm x 30cm, it counted 16 seedlings for plot No.1 (50 Kg/f), 17 seedlings for plot No.2 (60 Kg/f) and 21 seedling for plot No.3 (70 Kg/f). (Fig-2, and T.1).

4) According to the field observation on weed growth, the following points were recorded.

   1. Kinds of dominant weeds at the 2.5 leaf stage of rice were as follows:

      Cyperus difforms
      Echinochloa Spp.
      Ammannia baccifera

   These species of dominant weeds were controlled almost completely through the given chemical weedings (2 times).

   2. After the 2nd chemical weeding, other weeds which grew at the middle growth stage of rice were removed by hand weedings of 2 times.

   3. More effective weed control was observed in higher seed rate plot (Ex. No.3 [70 Kg/f.]), compared to the less effective weed control in lower seed rate plot (Ex. No.1 [50 Kg/f.]).

5) Measurements of yield components indicate that the higher seed rate increased the number of panicles per unit area under the given conditions in this trial. (Fig-2, Table-1).

6) As for the total paddy grain yields harvested by combine; the highest yield of 3.34 ton/f. (7.95 ton/ha) was recorded in plot No.3 (70Kg/f). It seemed to be due to the highest number of panicle per unit area in this plot No.3. And, it can be said that the higher the seed rate is the higher the yield is expected to be within a certain limit. (Fig-2, Table-1).

5. Conclusion:

Overall results have shown that the initial setback of poor germination, which situation seems likely to arise more frequently in dry-land direct seeding, can be overcome by the increase of seed rate, so that a sufficient number of panicles per unit area leading to a high yield may be obtained, assisted by the fertile soil conditions and the favorable climate in the Delta. Another necessary condition is to be able to achieve the successful weed control.

6. Proposal for the next year:

The results should be taken into consideration in implementing a series of system trials on mechanized direct seeding rice cultivation practices.

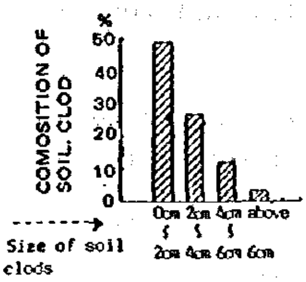


Fig-1.COMPOSITION OF SOIL CLODS

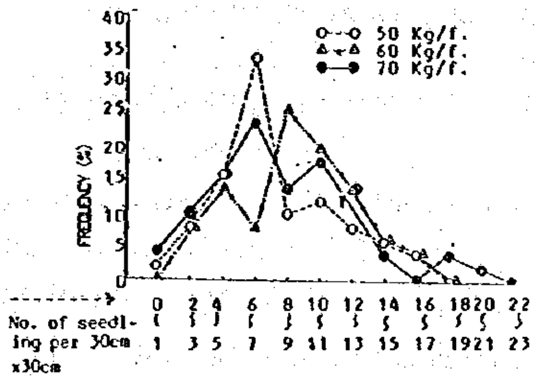


Fig-2. FREQUENCY OF SEEDLING No./30cm x 30cm

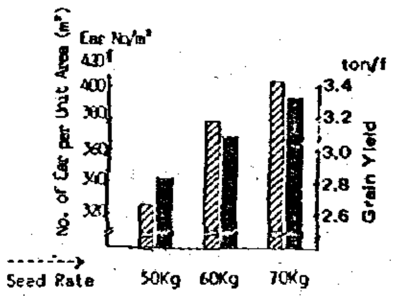


Fig-3, EFFECTS OF SEED RATE TO EAR No. & YIELD OF PADDY RICE

(Notes) Ear No.

Yield

Table 1. GROWTH & YIELD

No.	Name of Treatment	Germination in Incubator	No. of seedling 30cm x 30cm: Mean	S.D	(max-min)	** Ratio	Heading Date	Yield component: Length of culm	Length of ear	No. of Ear/m²	No. of g/E.	Grain Yield: ① Area	Harvested grains ②	Yield ③ = ②/① x4200	④ yield
1	50 Kg	%	8	3.7	0-16	% 14.5		cm 83	cm 20.2	327	124	m² 720	ton 0.4,87	2.83 ton/f	6.763 ton/ha
2	60 Kg	67.6	9	3.6	3-17	14.3	Sept.1st	77	19.2	379	123	720	0.5,31	3.09	7.375
3	70 Kg		8	4.3	0-21	10.8		85	19.6	403	128	720	0.5,74	3.34	7.972

(Notes) * Marked item shows Germination Ratio of seed in Incubator (30°c).

** Marked item shows the establishment ratio of seedling on the field.

(weight 1000 grains......20.3 Gr.).