

How the inundation is tapped and its water drawn off—first into the great reservoirs of Upper Egypt and then into the various canals—is explained elsewhere. Enough therefore to say here, that the rise varies from a minimum of about nineteen feet to a maximum of twenty-nine feet, the former height making a low or “bad” Nile, and the latter a dangerously high one, as most of the arable land on either side lies much below this level.* The rise of 1874 attained this perilous elevation, and but for the great energy of the authorities, personally directed on the spot by the Khedive, the banks below Cairo would have given way, and the whole of the Delta have been ruinously flooded. From twenty-three feet to twenty-four feet makes a “good” Nile, and this has been the average rise of seven out of the past ten years. As already mentioned, this care of the river-banks and of the canals and dykes forms a special labour-tax, which is assessed by local councils partly chosen by the fellahs themselves, and partly nominated by the mudir of the province. To these are attached Government engineers, with whose aid estimates and plans of the work to be done are periodically prepared and sent for approval to the Minister of Finance, who either rejects or lays them before the Privy Council and the Khedive. If thus finally sanctioned, they are remitted to the mudir, and the village sheikhs are ordered to detail the necessary hands for the work, which is then done entirely by *corvée* labour. In the distribution of this forced work by the sheikh-el-beled there is occasionally much injustice, although the aggrieved peasant has the right of appeal to the primary communal medjlis, and thence again to the higher pro-

* The crops of 1868 suffered heavily from an insufficiency of water, while those of 1869 and 1870 were correspondingly injured by an excess of it, through a too high Nile in both years.

vincial court. But this privilege is of little practical value, and as the sheikh allots the burden so it is generally borne. Although the chief water-supply of the country is derived from the reservoirs and canals thus made and maintained, it is importantly supplemented by an auxiliary system which, as before mentioned, absorbs a large amount of human and other animal labour. This consists of three very primitive machines called the *sakkia*, or Persian water-wheel, the *shadoof*, and (less commonly used) the *taboot*. The first of these is composed of a vertical wheel which raises the water out of a well—of which there are vast numbers all over the country, fed by infiltration from the Nile—into a continuous chain of earthen pots fixed to its tire, like the buckets of a dredging machine; of a smaller cog-wheel or pinion on the same axis, and of a large horizontal wheel, also cogged, which, driven by one or two oxen, according to the size of the machine, works into the pinion and sets the whole in motion. The great cattle-plague of 1864, which swept away more than half the oxen and buffaloes of Egypt, compelled the abandonment of many of these machines for want of animals to work them. The *shadoof*, or pole-and-bucket—familiar to all voyagers on the Nile—is a still ruder contrivance, consisting of a couple of posts or mud pillars about five feet high and three feet apart, supporting a cross beam, on the centre of which is poised a long pole having at its inland end a heavy counterpoising stone or ball of dried clay, and at the other, suspended to a rope or a couple of long palm sticks, a wicker basket lined with goat-skin, with which the water is swung up seven or eight feet into a trough to receive it. Three, four, five, or even six of these machines, in ascending series, are sometimes needed to raise the required water where the ground to be irrigated is high. The *taboot*

is a variation of the *sakkia* chiefly used in the Delta, where it is necessary to raise the water only a few feet. All three of these machines are very ancient, but especially the *shadoof*, as is shown by its frequent appearance in the tomb sculptures at Thebes and elsewhere.* One *sakkia*, it is estimated, does the work of five *shadoofs*, but this advantage is largely balanced by the greater original and working cost of the former machine. Besides these antique contrivances, nearly five hundred centrifugal pumps driven by portable steam engines are also at work throughout the country during low Nile, for the greater part on the Daira and other large estates. The remainder are jobbed out by private owners, who supply the pump, fuel, and a man to work it at rates varying from 3*l.* to 6*l.* per feddan, according to the quantity of water required, and the level of the ground to which it has to be thrown. That such rates can be paid by any of the smaller cultivators says much for the profits of Egyptian farming; but they are practically prohibitory for the majority, who therefore keep to the hardly less costly water-wheel and pole-and-bucket. The only efficient substitute for these old-world contrivances would seem to be some simple form of wind-driven machine, costing nothing for fuel and next to nothing for superintending labour; but against even this the conservatism of the fellah has hitherto been proof.

The cultivation carried on under these conditions varies considerably with the different districts, but everywhere, except on the Daira farms and on some of

* Wilkinson's *Ancient Egyptians*, ii., p. 4-5. There is also a variation of the *shadoof* called *chutweh*, which is worked by two men with four cords, but the more common form of the machine is that described above. The latest official return reports the total number of *sakkias* at 30,084, that of *shadoofs* at 70,058, of *taboots* at 6,926, and of steam pumps at 476, engaging the labour of more than 60,000 animals and 150,000 men for, on an average, about 180 days in the year.

those belonging to the richer Pashas, its methods are still as rude as when Joseph was *moufettish*. The ploughs, hoes, clod-crushing, threshing, winnowing, and other implements may, in fact, all be found in sculptured or painted counterpart on scores of tomb and temple walls anywhere between Beni-hassan and Edfou. Vainly have Reading and Ipswich tried to introduce into general use the improved tools of modern husbandry: the Khedive's and some of the larger private estates have adopted their steam ploughs, patent reaping-machines, and other novelties, but the peasant farmer will have none of them at any price Messrs. Howard or Ransome have yet been able to quote. In fact, as has been well said, "the earth is tickled with a hoe and laughs with a harvest," for over three-fourths of the country the soil is merely scratched with the crooked stick which here, as generally throughout the East, does duty as a plough.

Of the produce raised under these implemental disadvantages, *Cotton*, though of less aggregate value than the cereals, ranks first in importance. Although microscopic experiments with mummy-cloths have proved that the *byssos* of Herodotus was flax and not cotton, as was long supposed, there is abundant evidence that the latter plant was grown and used by the ancient Egyptians. It had, however, passed out of cultivation long before the modern era, and when, in 1821, a Frenchman found a specimen of the long-staple kind growing wild in the garden of a Cairene Bey, Mehemet Ali perceived the value of the discovery, and at once ordered as much of the seed as could be collected to be planted on one of his own farms. The result was a great success, and stimulated by the high price obtained for the new fibre in the European markets, the Viceroy—who then held monopolies of this and nearly every other produce of the country—pro

moted its extensive cultivation throughout Lower Egypt, the soil and climate of which were found to be admirably adapted to its growth. In 1838, Sea Island seed was introduced, but though the yield from it was at first excellent, the use of native (instead of freshly-imported foreign) seed in time affected both the quality and quantity of the crop; and as, besides, the cultivation of this variety required much greater care and labour than that of the native plant, its growth has been almost abandoned in favour of the latter, which has, on the whole, been found to pay better. This Sea Island growth is in commerce called "Gallini," and the old native plant "Mako," after the name of the Bey in whose garden it was discovered. The cultivation of the plant—of whichever variety—differs slightly according as the ground sown is *balieh*—i. e., watered solely by annual inundation—or *miscoweh*, which is not thus fully irrigated, but requires to be artificially watered several times before and after the seed-sowing. In Lower Egypt, where the land is fatter and stronger than above Cairo, one ploughing generally suffices before seed-time, but in the Upper Valley two at least are necessary—deep if the soil be light, but shallower where it is heavy. Small patches of ground are hoed where the cultivator cannot afford the cattle-power required for the plough. The ground being next levelled with the hoe or a rude kind of harrow, furrows are made about two feet apart, in which, at intervals of some three feet, holes are drilled three or four inches deep. Into each of these the sower drops half a dozen seeds, which he covers in with earth and waters, or not, and the operation is complete. The *balieh* lands are thus sown in March, and the *miscoweh* in April. Near the towns vegetables are generally planted between the furrows, to make the most of the ground: where this is not

done, the plants are thinned and earthed up by ploughing between the ridges. The frequent artificial watering needed by the *miscoweh* lands is more than repaid by the great superiority of their crop, in both quantity and quality, over that of the *balieh*; for while the latter yields only from two to three cantars (of 98 lbs.), the *miscoweh* gives from four to six, and on the best soil even eight cantars per feddan. The pods begin to ripen in September, and the first picking takes place in October, the second in November or early in December, and the third in January or February, when the cotton-trees, as they are called, are usually pulled up—the plant being now an annual in Egypt, reproduced from fresh seed—to make way for another crop, unless where the ground had been previously sown with beans or other pulse, in which case they are left to protect these latter from the occasional storms occurring in Lower Egypt during January and February. In some districts the stalks are not pulled up, but are cut close after the last gathering, and the ground is then sown with clover. In this way, besides this latter crop for feeding purposes, a second growth of cotton is obtained; but the quantity is much less, and the staple shorter than in the first. The numerous ginning factories with which private enterprise has, within the past few years, everywhere superseded the old rude *dulabs*, next separate the seed from the cotton, which is then sorted and packed into bags, or hydraulically pressed into bales, and carried rapidly off to Alexandria by one or other of the railways that now reticulate the country from Assiout to the sea. Within the past two or three years, complaint has been made of a deterioration in the quality of Egyptian cotton, and the result of an inquiry into its causes has shown that it is attributable chiefly to the careless mixture of different seeds in

the ginning mills, but in part also to the exhaustion of the land from the too frequent repetition of this crop, and the want of recuperative nourishment by manure.* Guano is now used by many of the larger cultivators, but the smaller ones can neither afford thus to renew their phosphates nor to follow a wiser rotation of crops. Amongst them, therefore, cotton comes round every second year instead of every third, as on the larger estates, and in spite of the annual gift of virgin soil from the Nile, the land becomes more and more impoverished. The action taken by the Government, however, to remedy both these causes of deterioration, has already effected a marked recovery in the quality of the staple, which may be expected to still further improve as intelligent care of the seed and its culture is continued. The latest available statistics, for 1875, return 871,847 feddans as having been under cotton crop in that year, producing

* Almost the only manures used in Egypt for agricultural purposes are pigeon's dung, cotton refuse, blood and the other *ejecta* of the slaughter-houses, and rotten fish. The first of these is produced in large quantities all over the country, by myriads of the half-domesticated house-pigeon and great flocks of the blue-rock wild bird, which are encouraged to roost in cots specially built for them in almost every village. The guano is carefully collected and sold at a price that practically confines its use to garden purposes, a portion of the Daira sugar estates being almost the only place where it is employed as a field dressing. About 260,000 tons of this manure are annually collected; the quantity used per feddan is about 9 cwt., containing thirty-five parts of azote and the same proportion of phosphate of lime. The other three kinds are totally insufficient for even the principal crops, and as there is a limit to the fertilising properties even of Nile mud, the result is the frequent exhaustion of the poorer cultivators' lands mentioned in the text. Other animal dung is gathered by the children, and, when mixed with chopped straw and formed into flat cakes dried in the sun, becomes the fuel called *gilleh*, about 100,000 tons of which are made annually. These cakes are preferred as fuel to cotton sticks or wood, as, when once well lighted, they retain their heat for a long time, and do not give off the smoke and pyroligneous acid which, when wood is burned, taint the bread in the rude earthen ovens used for the family bakings. The land is thus deprived of the largest class of its proper animal manure, and in the absence of artificial substitutes suffers as has been stated.

2,615,541 quintals (110 lbs. each) of ginned staple, 1,954,555 ardebs (of 5 bushels) of seed, and 3,749,446 loads of cotton sticks, of a total value of 12,267,487*l.* Of this 352,998 bales of about 5½ quintals each were exported from Alexandria, the remainder, barring a small quantity shipped for the Hedjaz, being kept for home consumption. The produce of 1874 was more than 400,000 bales in excess of this yield, and that of last year—from an area of nearly 1,000,000 feddans, and favoured by an unusually fine season, and an abundant but not excessive Nile—was much larger still. A measure of the increase in the growth of this staple during the present reign may be found in the fact that since the death of Saïd Pasha the quantity exported has augmented 257 per cent. as compared with the shipments of the previous thirteen years. Nor is this at all the full limit to which its culture may be easily and profitably extended. Competent local opinion affirms that without trenching on the cultivation of cereals—of which cotton only interferes with *dhouira*, as suiting the same kind of ground—1,000,000 bales might be grown annually, as only increased means of irrigation are needed to fertilise many thousand additional feddans of land admirably adapted to this crop, but which without water are now as sterile as the Sahara. As canals, unlike pioneer railways, are immediately reproductive, it is probable that for the next few years of compelled economy the chief outlay on public works will be in this direction; and, if so, before the Moukabala expires the further expansion of cotton culture alone may go far to recoup its loss to the Treasury.*

* Since the above was written, a new cotton plant has been introduced which promises to revolutionise the whole culture of this staple in Egypt. It was discovered in 1873, by a Copt, near Birket-el-Sab, a station on the Cairo railway in the upper part of the Delta, who noticed in a cotton field a plant that differed greatly in appearance from the rest. He gathered its

Although cereal produce has not increased in the same high ratio as cotton, its augmentation within the past twenty, and still more the past forty years, has also been very great. Thus, while the eight or nine crops falling within this category only produced 3,585,000 ardebs in 1834,* their gross yield, exclusive of sugar-cane, amounted to 25,670,000 ardebs in 1875. Of this large total, *Wheat*, which in 1834 figured for only 950,000 ardebs, had two years ago developed to 6,662,632 ardebs, worth—at 120 piastres each—E. £7,995,158. Of this, however, less than 400,000 ardebs were exported from Alexandria, chiefly to England and France; home consumption and a small exportation to Arabia accounting for the remainder. The culture of this crop, like that of cotton, differs according to the districts in which it is grown. In Upper Egypt, where the heat is greater, its seed-time and harvest are both a month earlier than in the lower provinces. The subsidence of the inundation at the end of October—when what is called the *shitawee*, or winter season,

pod, in all about seventy, and planted the seeds secretly in an isolated plot of ground, where the yield even the first year was more than treble that of the common plant. The result of the second and third years' sowing was even greater, and the discovery could no longer be concealed. The new plant, which is very thickly studded with pods, grows to a height of nearly ten feet, has no branches and only very few leaves, which permits its being planted much more closely than the common one. To distinguish it from the latter it has received the name of *bamia* cotton, from its likeness to the vegetable of that name. Between 300 and 400 ardebs (270 lbs. each) of the new seed are now available for sowing, and so high are the expectations from it that a few weeks ago it sold readily in the market at from 25% to 30% an ardeb, as against 1% for the old seed. As it multiplies at the rate of sixty to one, the next crop should yield above 20,000 ardebs of seed, or nearly enough to sow the whole cotton-growing land of the country four times over. The quality of the new staple being quite equal to that of the old plant, the immediate effect would be to at least triple the yield (and consequent money value) of this great crop, without at all extending the area of cultivation. The result of the present year's experiment will, therefore, be awaited with curious interest.

* Dr. Bowering's "Report" (1840), p. 17.

begins—is there immediately followed, while the soil is still miry, by a preparatory ploughing, and on the half-dried earth thus roughly turned up the seed is then sown broadcast without further labour. The harvesting takes place in April, when the stocks are cut, carried on ass or camel back to the village threshing-floor, and there beaten out, in the upper districts of the Saïd by a yoke of oxen driven round the heap, or in the Middle and Lower provinces by the *nóreg*, a rude wooden frame moving on thin iron wheels, which, drawn in a circle by a couple of oxen, separates the grain from the ear and at the same time cuts the straw for fodder. This last is then tossed into the air with two-pronged wooden forks, and the operation of winnowing—as rudely simple as all that precedes—is complete. In Lower Egypt two ploughings are given, one before and the other shortly after the sowing, which here takes place late in November. The second ploughing serves instead of a harrowing, and improves the crop. Where this last fails, through the action of worm or from any other cause, a third ploughing and second sowing are given, or the land is used for maize. In both sections of the country a feddan receives about 1½ of an ardeb of seed, and yields from 4 to 7, or in the best land even 8 ardebs of grain, which is, it may be added, all bearded.

The next great staple crop of Egypt is that of *Dhoura*, or maize, which forms the chief food of the fellaheen. Of this there are two varieties—the *dhoura sêft*, or summer maize, and the *dhoura Nili*, more properly millet, which is cultivated at high Nile: they are also respectively called *beladi* (native) and *shâmy** (foreign), the latter being probably of Syrian origin. This last is a large

* Called also *dhoura byood*. In the case of this variety of the grain, or in others in which unusual care is required in the tillage of the land, a clod-crushing machine, called *khonfad*, is sometimes used instead of the hoe.